



## International Herbage Seed Group

# Newsletter

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## Seed production & 2013 workshop

### IHSG

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Editor's note: The arrival of spring blossoms in the southern hemisphere brings post-winter seed crop management. Meanwhile, the North is busy with post-harvest management and autumn sowing. In this issue we take a look at the seed production industry in Uruguay, Italy and the Czech Republic, improving seed yield in perennial ryegrass, forage seed research in China and look back at the Tropical Grassland Society. In this issue there is also information on the 2013 IHSG workshop in Canterbury, NZ. This is issue number 47 of the newsletter. Details of the contact person in your area are listed on the back page of the newsletter and on the IHSG website <http://www.ihsg.org/>. Please continue to send articles, updates or short papers to your area contact person to be included in future newsletters.

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## President's Column

Welcome to the 47<sup>th</sup> edition of the IHSG newsletter. I'm very pleased that this issue contains reports from six different countries: Uruguay, Italy, The Czech Republic, Wales, China and Australia as well as information on the IHSG workshop in New Zealand September 2013.

There is a common theme for most of the reports and I'm sure you will recognize: The need to improve yields in herbage seed crops! In Uruguay herbage seed crops are competing against soybean and good prices in general for all farm products, which overall creates a demand for "better seeds to improve pasture production". It seems that herbage seed production is currently expanding in this part of South America.

Italy is a big player in legumes with 12 different species in seed production, but still "economic competitiveness" is a main problem. Perhaps a stronger collaboration between seed production and pollination research would be of benefit? We are currently seeing an increasing interest in pollinators but to my knowledge it has not brought us larger research projects within herbage seed production. Perhaps some of you know better?

In general, funding of herbage seed research is very, very difficult as I believe with all agricultural research. Also, in most cases industry co-funding is needed to attain public funding. In Czech Republic this has led to the formation of the Association of Grass and Legume Seed Growers, which is supporting research. The list of grass species in seed production in Czech Republic is impressive – more than 22 species. Again it's mentioned that obtaining high yields are difficult – in particular for new seed growers. Therefore it's also very stimulating to read about the new research project in Wales: A collaborative project focussing on improving seed yield of perennial ryegrass. With the increasing demand for agricultural products for food,

feed and bioenergy, the competitiveness between crops will increase, and more focus on increasing herbage seed yields are very important – using both genetic, agronomic and management tools.

The local organizing committee of the IHSG workshop invites you to New Zealand in September 2013. A quite detailed programme is already available covering the period Sunday 22<sup>nd</sup> to Thursday 26<sup>th</sup> and there will be lots of possibilities for discussions and fields visits. This reflects that we hope to see researchers, advisors and farmers attending. Seed production research is characterised by the close contact between science, industry and practice. In particular this is illustrated in the way field research is carried out in New Zealand.

A pre-workshop tour is also offered – and I believe all who have been to New Zealand would strongly recommend taking this opportunity to visit some of the most fantastic nature. Please take notice that expressions of interest for attending the workshop and pre-workshop tour should be sent to Phil, Jason or Richard.

Enjoy this issue of the International Herbage Seed Group newsletter and keep sending us reports.

President  
Birte Boelt

## Herbage Seed Production in Uruguay

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Uruguay is located in South America between latitude 30° and 35° S, determining temperate climatic conditions in the south of the country and subtropical in the north. Fourteen million hectares are used for beef, cattle and wood production, but less than two million are cultivated with non native species. The remainder is occupied by natural pastures with minimal addition of fertilizers or seeds of other species. The main grass species sown for intensive forage production are oat, annual rye grass, tall fescue, orchard grass and brome grass. In the case of legumes the principal species are alfalfa, birdsfoot trefoil, red clover and white clover.

Herbage seed production was for many years a by-product of forage production. Minimal technology, a poorly regulated market and few productive alternatives were the most common situations. Traditionally the farmers gave attention to the seed fields from the last grazing until harvest and the majority of the work to reach seed standards was done post-harvest in the seed cleaning process.

At present, good prices for almost all of the agriculture practices and animal products

determines a new situation, with high land prices and a strong competition among the different production alternatives.

The seed industry has responded with an improved specialization of the farmers with good results in yield and quality in some of the principal species.

A challenge, and main objective, is to maintain herbage seed production in the same land where a farmer could easily produce soybean grain with excellent results. This can only be achieved with higher seed yields.

There are some areas of research in which we are working that can improve seed production: pollination (red clover and alfalfa), irrigation (grasses), weed control (legumes), harvest technology (time of harvest, equipment) and post-harvest processes.

It is a good time for Uruguayan herbage seed production with many challenges but clear rules and a strong regulated market. We have excellent farmers and companies, dynamic varieties being released and an increase in the demand for better seeds to improve pasture production.

## Forage seed production and certification in Italy

R. Torricelli and M. Falcinelli

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The most important forage crop species in Italy belong to *Leguminosae* and *Graminaceae* families and are grouped in annual legumes, perennial legumes and grasses. In Italy the production, certification and commercialization of forage seeds are

subjected to the national law 1096, (1971) that has been harmonized with the European Union legislation. According to EU legislations in order to market the forage seeds it is necessary that the variety is registered in the National or Community register of varieties, and is

mandatory for official seed certification. In Italy, the ENSE (Ente Nazionale Sementi Elette) is the certification Agency and is a body established to control the production of forage seed and ensure its quality.

The steps involved in the production of certified seed are: i) field inspections of seed crops; ii) controls during mechanical selection; iii) release of official certification labels; iv) and post-control of certified seed. At the end of this process, the seed is marketed and each bag of seed must carry a label with the following information: generation seed, species, variety, seed lot number, weight, date of seed production, purity and germination rate.

In EU 57% of the area in forage seed production are grasses, 171,320 ha for a certified tonnage of 230,200 tons. Ryegrass (*Lolium multiflorum* Lam.) and tall fescue (*Festuca arundinacea* Schreb) dominate forage production respectively with 128,400 tons and 74,500 tons. Legumes represent 35% of the area in forage seed production, 105,630 ha for a tonnage of 64,000 tons. Vetch (*Vicia sativa* L.) and alfalfa (*Medicago sativa* L.) have the largest production with respectively 29,350 tons and 15,900 tons (<http://www.escaa.org>).

In Italy, because of its Mediterranean climatic conditions and geographical features the forage seed production varies from the North to the South of the peninsula. The rainfall is generally good in the North, drought at the end of the spring and in the summer is generally severe in the South and in the islands. The environmental and climatic variability has favoured the development of traditional seed production areas. The Central-North Italy is the most important area for alfalfa (*M. sativa*) seed production, while

in the Central Southern Italy is produced seed of annual legumes species like berseem clover (*Trifolium alexandrinum* L.), crimson clover (*T. incarnatum* L.) and persian clover (*T. resupinatum* L.). Field bean (*Vicia faba* L.) and vetch (*V. sativa*.) are a typically Mediterranean crop and in recent years their seed production has been increasing due to European Community aids. Sulla (*Hedysarum coronarium* L.) and sainfoin (*Onobrychis viciifolia* Scop.) are cultivated in the South and Central region. Grass seed production is concentrated in Central-North Italy close to the Adriatic sea (Bravi *et al.* 1999; Falcinelli, 2006).

In 2011 the area of legume forage seed production was 33,266 ha (87.46%) for a certified tonnage of 23,472 t. Alfalfa was the largest with 7,133 t, followed by vetch, field bean and berseem clover with 5,393, 5,277 and 3,555 t respectively.

Grasses represented only 13.57 % of the area with 4,770 ha and a tonnage of 8,891 t. Italian ryegrass (*L. multiflorum*) was the largest with 8,641 t (Table 1).

Seed production of forage species in Italy is largely insufficient to cover the national needs, indeed Italy imports large amounts of forage seed. The weakness of the Italian seed trade system is due to the limited economic competitiveness of the seed production activity and in consequence of an inadequate definition of agronomic practices and seed production is often seen as a by-production of forage cropping (Romani *et al.* 1999). Moreover, the technological content of most forage seed is low because forage have not benefitted from as much breeding as other crops (Lorenzetti and Rosellini, 1999; Falcinelli, 2006).

**Table 1.** Officially controlled area (ha) and certified seed yield (t) of forage species in Italy in 2011 (<http://www.ense.it>).

Species	2011	
	Hectares	Tons
<b>Legumes</b>		
Alfalfa ( <i>Medicago sativa</i> )	17299	7133
Red clover ( <i>Trifolium pratense</i> )	154	200
White clover ( <i>T. repens</i> )	3	35
Crimson clover ( <i>T. incarnatum</i> )	1277	1311
Persian clover ( <i>T. resupinatum</i> )	744	362
Berseem clover ( <i>T. alexandrinum</i> )	6333	3555
Sulla ( <i>Hedisarium coronarium</i> )	162	34
Sainfoin ( <i>Onobrychis viciifolia</i> )	70	30
Birdsfoot trefoil ( <i>Lotus corniculatus</i> )	74	51
Common vetch ( <i>Vicia sativa</i> )	3462	5393
Wolly-pod vetch ( <i>V. vellutata</i> )	56	91
Fieldbean ( <i>V. Faba</i> )	3632	5277
	<b>33266</b>	<b>23472</b>
<b>Grasses</b>		
Italian ryegrass ( <i>Lolium multiflorum</i> )	4730	8641
Perennial ryegrass ( <i>L. perenne</i> )	24	125
Cooksfoot ( <i>Dactylis glomerata</i> )	10	23
Tall fescue ( <i>Festuca arundinacea</i> )	6	102
	<b>4770</b>	<b>8891</b>

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## Herbage seed production in the Czech Republic

Radek Machac<sup>1</sup> and Jan Machac<sup>2</sup>

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Herbage seed production, especially grass seed production, have a long history in the Czech Republic. First attempts at growing selected grass species (Yellow oat-grass, Swamp meadowgrass and Red Fescue) were carried out in south Bohemia at the end of the 19th century. The expansion of seed production through to the end of the twentieth century was largely due to researchers from the Grassland Research Station at Roznov. Grass seed crops quickly expanded and during several years the fields with “Roznov dolls ” came an inseparable part of the Wallachian (north-east part of the Czech Republic) landscape. Development of grass seed production was integrated with breeding and in 1940 the first 15 new grass varieties named “Roznovsky” or “Roznovska” were registered. Increased acreage of grass seed crops and high production of grass seed caused the Czech Republic to become an important exporter of this commodity. After communism, accession to governance inhibited grass and legume seed production. However, by the late 1970’s government realized that the production of meat and milk relied on intense production of fodder, especially grasslands and grass/clover. New development of seed production of fodder crops occurred not only for domestic use but also for export. Further decline of seed production occurred after “the velvet revolution”, when Czech economics merged back into capitalism. High supplies of seeds led to a decline in price which in turn led to a lack of research in their production. However, after 1995 again seed production was revitalized and herbage seed crops are now second only to cereals. After the admission of the Czech Republic to the European Union herbage seed production increased and now the Czech Republic is 5th in area of herbage seed crops within the European Union. In 2005, the area of grass seed crops was approximately 19,000 ha and clover seed crops occupied almost 10,000 ha. However, the start of the world's financial crisis affected seed production of fodder crops. In the Czech

Republic a decline in price led to decline of seed crop area, but currently demand for seeds is again increasing and the area of herbage seed crops has extended.

The Czech Republic is unique for the wide assortment grass species which are grown for seed. In addition to 22 grass species and 5 legume species the following species are also grown on small acreage : *Agrostis stolonifera*, *Bromus inermis*, *Bromus erectus*, *Bromus marginatus*, *Poa compressa*, *Deschampsia caespitosa* and *Anthoxanthum odoratum*. Also minor legume species are grown: *Coronilla varia*, *Trifolium alexandrinum*, *Trifolium resupinatum*, *Medicago lupulina*, *Melilotus albus*, *Trigonella foenum-graecum*, *Anthyllis vulneraria*, *Onobrychis viciifolia*, *Lotus corniculatus* and *Lotus ornithopodioides*. An issue of Czech herbage seed production is the low seed yields. Although good producers reach seed yields comparable with foreign growers, frequent changes in ownership of agricultural companies leads to variation of farm structure. New seed growers do not have the necessary experience and equipment, which affects seed yield. Also government aid for research is lacking. In response, growers and seed enterprises founded the Association of Grass and Legume Seed Growers, to partially fund research and technology of herbage seed crops. In the Czech Republic through 2006-2011 export of herbage seed exceeded import at a rate of 3.1 to 1. The predominant exported grass species are ryegrass, meadow fescue, *Festulolium* and Timothy. The predominant imported species are red fescue and Kentucky bluegrass, where soil-climatic conditions aren't good for these species compared with European seaside countries or US. Major legumes exported are red clover and *Trifolium incarnatum* (Crimson clover, Italian clover or Incarnate). We hope that this successful branch of our agriculture will be further developed to benefit both Czech farmers and farmers in other countries.

## Improving seed yield of perennial ryegrass

Richard Hayes

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Grass breeders at IBERS, Aberystwyth University, have begun a five year research project co-funded by the Technology Strategy Board with the primary objective of improving the seed yield of new varieties of perennial ryegrass. The project, entitled 'BRIMVAR', brings together the only UK owned forage grass and legume seed production and wholesale company (Germinal Holdings), the major UK forage plant breeding and genetics research organisation (IBERS, Aberystwyth) and a large farmer based organisation engaged in crop evaluation and technology (NIAB-TAG).

Irrespective of the agronomic yield (dry matter) and forage quality of a variety, the capacity of a variety to produce economic seed yields is integral to its commercial success. The BRIMVAR project aims to address the commercially important trait of seed yield in perennial ryegrasses using both conventional and molecular breeding techniques. Ryegrasses are defined as a non-domesticated crop; that is the seed is not retained on the panicle as with cereals; in addition, selection for forage quality is known to be negatively correlated with seed production. Therefore as a commercial crop, forage grass seed producers face considerable challenges to maximise their productivity, hence any seed yield enhancement is likely to be of significant economic importance.

BRIMVAR builds upon previous genetic research at IBERS that identified a single locus in a number of perennial ryegrass mapping populations that has been shown to be associated with seed set (the proportion of ovules forming seeds) and which should therefore result in improved seed yield. Within the IBERS diploid perennial ryegrass breeding programmes, three specific alleles

have been identified at the locus, the type 'a' allele has been associated with improved seed set while both the 'b' and 'd' variants present in the populations are linked with reduced seed set. The alleles 'a' and 'b' account for ~95% of the allelic variation within the breeding populations.

The half-sibling recurrent selection breeding methodology employed at IBERS enables the accurate prediction of varietal phenotype when four parental genotypes are used to construct a new variety. The BRIMVAR project aims to utilise this predictive methodology to construct nine experimental varieties, each derived from four parental genotypes, that will not significantly differ from each other for any agronomic trait, but will vary, based upon parental genotype, from eight copies of the 'a' allele through to eight copies of the 'b' allele. These varieties will be trialled in replicated plots for agronomic performance and for seed production to determine the magnitude of effect the seed set associated locus has upon commercially relevant germplasm.

If successful, the ratio of 'a' to 'b' or 'd' alleles will be improved within the breeding populations, while varieties constructed at IBERS will benefit from enhanced seed production and so be of greater commercial value for seed growers. With the potential to increase seed production, the uptake of elite Aber HSG™ varieties on farm will lead to increased animal performance, with more meat and milk produced, while reducing the environmental footprint of ruminant agriculture as methane and nitrous oxide emissions are lowered.



## Introduction of Forage Seed Research Team

Peisheng Mao

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The Forage Seed Research Team belongs to the Department of Grassland Science at the China Agricultural University in Beijing.. There are 10 staff, led by Prof Peisheng Mao, working on research investigating herbage and turfgrass seed science. At present, three research fields are developed by our team including seed physiology, seed production and seed testing standardization. In the research area of seed physiology, we focus on the physiological and biochemical changes during seed deterioration of *Leymus chinensis*, *Elymus sibiricus*, *Festuca arundinacea*, *Avena sativa* etc., and try to find the key factors that cause seed to deteriorate. Some treatments such as storage duration and seed moisture content are adopted to explore the mechanism causing seed vigour lost during seed deterioration. There are also some projects financially supported by National Key Technologies R&D Program of the 12th Five-Year Plan (2011BAD17B01-02) and PhD. Program Foundation of Ministry of Education of China (20110008110003) .

In the research area of seed production, seed production technologies are also important for improving forage seed yield and quality in China. *Medicago sativa* and *Elymus sibiricus* are the main species which are in the field experiments to study the management technologies including seeding time, fertilization rate and time, irrigation, harvesting method and time etc. in the Northwest of China. We also have some projects for seed production financially supported by National Key Technologies R&D Program of the 12th Five-Year Plan (2011BAD17B01-02) and China forage and grass research system (CARS-35). In the research area of seed testing, the Forage Seed Lab has been a member of ISTA since 1989 and is qualified for seed quality testing. We have studied and determined seed germination conditions required for over 50 species not listed by ISTA, and researched testing methods of seed vigour.

## TROPICAL GRASSLAND SOCIETY WOUND UP

Don Loch

The University of Queensland

The winding up of the Tropical Grassland Society of Australia (TGSA) in December 2010 after less than 50 years in existence serves as a salutary reminder of how areas of scientific activity can wax and wane quite quickly.

The Society was officially formed in 1963 to promote the practical application of research information on pasture management and improvement in tropical and sub-tropical environments. This was an exciting era when the knowledge and application of tropical pasture science were expanding rapidly across northern Australia driven by research and extension conducted by growing numbers of scientists in CSIRO, state departments of agriculture, and universities. In this scenario, the TGSA through its newsletter and its regular and well-attended field meetings provided an important forum for interaction between graziers and scientists. Allied to this, the Society's journal, *Tropical Grasslands* (started in 1967), provided a medium for the publication of research results that had a practical focus. The TGSA membership covered wide interests across the many aspects of tropical grasslands. The TGSA membership covered wide interests across the many aspects of tropical grasslands, including primary producers, private companies and

government research and extension personnel in Australia and from overseas. However, as research activities dwindled through lack of industry and public funding and as many of the scientists originally involved retired without replacement during the 1990s and 2000s, membership declined and it became apparent that the Society no longer had the continuity of younger office bearers to remain viable, hence the decision to wind up the TGSA in December 2010.

Nevertheless, TGSA's legacy continues through the 44 volumes of *Tropical Grasslands* journal now archived and freely available on the web (through <http://www.tropicalgrasslands.asn.au/>). These contain more than 1000 research and review papers, conference proceedings, cultivar descriptions and book reviews by authors from Australia and 54 other countries. While the majority of these will be of interest only to forage researchers, there are also quite a few publications of direct and indirect relevance to turf researchers and rehabilitation of degraded or mined land, including papers on dual-purpose species (e.g. *Axonopus fissifolius*, *Cynodon dactylon*, *Eremochloa ophiuroides*, *Paspalum notatum*, *Pennisetum clandestinum*, *Zoysia* spp.) and native grasses and grasslands.



**2013 IHSG Workshop, New Zealand**  
**22-26 September 2013**

You are invited to New Zealand to attend the 2013 IHSG Workshop which follows the International Grasslands Conference (IGC) Sydney, Australia. It is only a short 3 hour flight from Sydney to Christchurch. The Workshop will be based at Methven, 100 km SW of Christchurch and in the heart of the Canterbury seed production area. 98% of New Zealand's herbage, turf and vegetable seed production is based in the Canterbury Plains area. As a backdrop to Methven we have snow capped mountains and the Mt. Hutt ski field.

Workshop theme: *"R&D adoption by seed growers-making good science work on farm"* Topics covered:

- Environmental impacts and optimization of N inputs;
- Integration of livestock into high yielding seed crops;
- Integration of vegetable seed cropping and arable crops into herbage seed crops
- Irrigation response and variable rate irrigation technology;
- Integration of remote sensing & GPS technologies into seed crops.

**Programme: Sunday 22 September evening to evening of Thursday 26 September 2013**

**Sunday 22<sup>nd</sup>**

Registration in Christchurch between 5 to 7 pm at Hotel Commodore (<http://www.commodore.net.nz/>) followed by official welcome from local kappa haka group traditional Maori welcome and buffet meal. The Hotel is 1 km from the Christchurch Airport.

**Monday 23<sup>rd</sup>.**

Depart from Christchurch at 8:30 am to Lincoln area (20 km) visiting seed research trials at AgResearch, Lincoln University Seed Research Centre and PGGW Kimihia Research Stations. Afternoon travel to Methven via Rakaia with farm visits in the Barhill area (white clover) followed

by arrival at Methven Resort (<http://www.methvenresort.com/>) by 5:30 pm; evening dinner at Methven Resort.

### **Tuesday 24<sup>th</sup>.**

Morning-presentations and workshop; afternoon focus on bringing NZ Seed Growers and workshop participants together (with some of the international visitors to speak to farmers); with stops at two local seed farms finishing with a “spit-roast” and BBQ evening function;

### **Wednesday 25<sup>th</sup>**

Morning-presentations; afternoon visit to local seed farms using remote sensing technologies and integration of dairy and herbage seed-arable operations; local seed grower with seed cleaning plant; Dinner and General Meeting at Terrace Downs (<http://www.terracedowns.co.nz/>)(30 km from Methven).

### **Thursday 26<sup>th</sup> .**

Morning presentation; 11:00 am travel to Ashburton (30 km) and visit seed farms using variable rate irrigation and range of seed crops, integrated vegetable-forage seed production and use of GPS guided machinery in seed crops. Return to Hotel Commodore, Christchurch by 5 pm. Wrap up Workshop with an optional meal at a local winery.

### **What will the morning Workshop sessions cover?**

There will be five Workshop sessions; each 1½ hours in length. The possible topics might include but not limited to:

- a. Technologies for seed production (GPS systems, remote sensing, variable rate irrigation);
- b. Seed yield limitations
- c. Managing footprints: energy, C, GHG, N footprints
- d. Field Research- what should we be measuring so trials across countries can be compared? Doing on-farm trials including plot areas; small plot (30+ m<sup>2</sup> versus very large (0.25 ha)
- e. Managing gene flow and is co-existence a myth?
- f. Weeds, diseases, pests & pollinators;
- g. The next generation: Succession planning- bring the next generation of researchers; and research tools for seed research including role of genomics technologies:
- h. Systems approaches to seed production research

### **Pre-workshop Tour!**

We are offering a 2 ½ day pre workshop tour, departing Christchurch on Friday late afternoon, travelling 120 km north to the coastal town of Kaikoura (<http://www.kaikoura.co.nz/>).

Saturday morning will see you in small boats to watch whales, before heading inland to soak in the natural hot springs of Hanmer Springs (<http://www.hanmersprings.co.nz/>)(with an opportunity for bungy jumping or jet boat rides).

Sunday morning will see you crossing the Southern Alps and seeing native rain forests and mountains and following the Grey River to the west coast town of Greymouth

([http://www.westcoastnz.com/visit/visit-Greymouth\\_Blackball/](http://www.westcoastnz.com/visit/visit-Greymouth_Blackball/)) to catch the scenic train ride back through the Southern Alps and Arthur’s Pass (<http://www.doc.govt.nz/parks-and-recreation/national-parks/arthur-pass/>) arriving in Christchurch in time to register.

Note: The cost of this tour has yet to be finalised.

**Workshop costs**

A preliminary estimate of the workshop registration cost (including GST) is \$NZ 550 (including all meals, buses and related costs) but not accommodation. At current exchange rate this equates to 350 Euro; or USD 460.

Accommodation at Methven is \$NZ 115/night for single rooms and a \$NZ 130 for a double/twin bed room (ie \$65/person). Accommodation in Christchurch at the Commodore is \$NZ180/night single or shared. You are free to make alternative accommodation arrangements.

**Registration Process**

A Workshop web site page is under development for Registration and with detailed information. Links to this will be posted on the IHSG web page.

**Expressions of interest**

If you are interested in attending please advise Phil Rolston, Jason Trethewey or Richard Chynoweth with your name and an email contact. Let us also know if you are interested in the pre-workshop tour.

Your local organizing committee have all attended some or all of our recent IHSG conferences;

Australia, Norway and Texas. They are:

Phil Rolston (AgResearch)- [phil.rolston@agresearch.co.nz](mailto:phil.rolston@agresearch.co.nz)

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2013 Workshop view of seed farms in the Methven area, New Zealand in mid spring.