

Table of contents

Foreword	7
Keynote presentations	17
Objectives and benefits of molecular breeding in forage species <i>T. Lübberstedt</i>	19
Introgression mapping in the grasses <i>I.P. King, J. King, I.P. Armstead, J.A. Harper, L.A. Roberts, H. Thomas, H.J. Ougham, R.N. Jones, A. Thomas, B.J. Moore, L. Huang and I.S. Donnison</i>	31
QTL analysis and trait dissection in ryegrasses (<i>Lolium</i> spp.) <i>T. Yamada and J.W. Forster</i>	43
Translational genomics for alfalfa varietal improvement <i>G.D. May</i>	55
Application of molecular technologies in forage plant breeding <i>K.F. Smith, J.W. Forster, M.P. Dobrowolski, N.O.I. Cogan, N.R. Bannan, E. van Zijll de Jong, M. Emmerling and G.C. Spangenberg</i>	63
A computational pipeline for the development of comparative anchor tagged sequence (CATS) markers <i>L. Schauser, J. Fredshund, L. Heegaard Madsen, N. Sandal and J. Stougaard</i>	73
Future directions in the molecular breeding of forage and turf <i>G.C. Spangenberg, J.W. Forster, D. Edwards, U. John, A. Mouradov, M. Emmerling, J. Batley, S. Felitti, N.O.I. Cogan, K.F. Smith and M.P. Dobrowolski</i>	83
Application of molecular markers in genetic resources management of perennial ryegrass <i>R. van Treuren</i>	99
Section 1: Objectives, benefits and targets of molecular breeding	111
Leaves of high yielding perennial ryegrass contain less aggregated Rubisco than S23 <i>A. Kingston-Smith and P.W. Wilkins</i>	113
Variability in quantity and composition of water soluble carbohydrates among Irish accessions and European varieties of perennial ryegrass <i>S. McGrath, S. Barth, A. Frohlich, M. Francioso, S.A. Lamorte and T.R. Hodkinson</i>	114
Introgression breeding for improvement of winter hardiness in <i>Lolium</i> / <i>Festuca</i> complex using androgenesis <i>T. Yamada, Y.D. Guo and Y. Mizukami</i>	115
A new napier grass stunting disease in Kenya associated with phytoplasma <i>A.B. Orodho, S.I. Ajanga, P. Jones and P.O. Mudavadi</i>	116
Studies of seed characteristics of ecotypes of lucerne, <i>Bromus</i> and <i>Agropyron</i> in response to <i>Fusarium oxysporum</i> and <i>F. solani</i> <i>M.A. Alizadeh</i>	117
Genetic analysis of the interaction between the host perennial ryegrass and the crown rust pathogen (<i>Puccinia coronata</i> f.sp. <i>lolii</i>) <i>P.M. Dracatos, J.L. Dumsday, R.S. Olle, N.O.I. Cogan, M.P. Dobrowolski, K.F. Smith and J.W. Forster</i>	118
Molecular characterisation of bacterial wilt resistance in <i>Lolium multiflorum</i> Lam. <i>B. Studer, B. Boller, F. Widmer, U.K. Posselt, E. Bauer and R. Kölliker</i>	119
Discriminating stay-green grasses using hyperspectral imaging and chemometrics <i>J. Taylor, B. Moore, J.J. Rowland, H. Thomas and H. Ougham</i>	120
Non-destructive assessment of quality and yield for grass-breeding <i>A.G.T. Schut, M.J.J. Pustjens, P. Wilkins, J. Meuleman, P. Reyns, A. Lovatt and G.W.A.M. van der Heijden</i>	121
Root senescence in red clover (<i>Trifolium pratense</i> L.) <i>K.J. Webb, E. Tuck and S. Heywood</i>	122
Tropical vine legume-maize mixtures for enhanced silage in temperate climates <i>H. Riday</i>	123

Section 2: Linkage/physical mapping and map-based cloning of genes	125
Development of simple sequence repeat (SSR) markers and their use to assess genetic diversity in apomictic Guinea grass (<i>Panicum maximum</i> Jacq.)	127
<i>M. Ebina, K. Kouki, S. Tsuruta, M. Takahara, M. Kobayashi, T. Yamamoto, K. Nakajima and H. Nakagawa</i>	127
Construction of microsatellite-enriched libraries for tropical forage species and characterization of the repetitive sequences found in <i>Brachiaria brizantha</i>	128
<i>L. Jungmann, C.B. do Valle, P.R. Laborda, R.M.S. Resende, L. Jank and A.P. de Souza</i>	128
Isolation of SSR markers from Zoysiagrass	129
<i>H. Cai, N. Yuyama and M. Inoue</i>	129
Development of SSR markers for variety identification in Italian ryegrass (<i>Lolium multiflorum</i> Lam.)	130
<i>M. Inoue, N. Yuyama and H. Cai</i>	130
Development of EST-derived simple sequence repeat (SSR) markers in Italian ryegrass (<i>Lolium multiflorum</i> Lam.)	131
<i>M. Hirata, Y. Miura, T. Takamizo and M. Fujimori</i>	131
Development of a microsatellite library in <i>Lolium perenne</i>	132
<i>J. King, I.P. King, D. Thorogood, L. Roberts, K. Skot and K. Elborough</i>	132
Tall fescue expressed sequence tag and simple sequence repeats: important resources for grass species	133
<i>M.C. Saha, J.C. Zwonitzer, K. Chekhovskiy and M.A.R. Mian</i>	133
Development of EST and AFLP markers linked to a gene for resistance to ryegrass blast (<i>Pyricularia</i> sp.) in Italian ryegrass (<i>Lolium multiflorum</i> Lam.)	134
<i>Y. Miura, C. Ding, R. Ozaki, M. Hirata, M. Fujimori, H. Cai and K. Mizuno</i>	134
Construction and exploitation of a bacterial artificial chromosome (BAC) library for <i>Lolium perenne</i> (perennial ryegrass)	135
<i>K. Farrar, A.M. Thomas, M.O. Humphreys and I.S. Donnison</i>	135
Characterisation of perennial ryegrass parental inbred lines for generating recombinant inbred lines for fine mapping and gene cloning	136
<i>U.C.M. Anhalt, S. Barth, T. Schwarzacher and J.S. Heslop-Harrison</i>	136
A high-density SSR linkage map of red clover and its transferability to other legumes	137
<i>S. Isobe, S. Sato, E. Asamizu, I. Klimenko, N.N. Kozlov, K. Okumura and S. Tabata</i>	137
Estimation of the coefficient of double-reduction in autotetraploid lucerne	138
<i>R. Ayadi, P. Barre, C. Huyghe and B. Julier</i>	138
A core AFLP map of aposporic tetraploid <i>Paspalum notatum</i> (Bahia grass)	139
<i>J.P.A. Ortiz, J. Stein, E.J. Martínez, S.C. Pessino and C.L. Quarín</i>	139
Repulsion-phase linkage analysis of tetraploid creeping bentgrass (<i>Agrostis stolonifera</i> L.)	140
<i>S.E. Warnke, N. Chakraborty and G. Jung</i>	140
Towards a genetic map in creeping bentgrass based on SSRs, AFLPs and RFLPs	141
<i>H. Zhao and S. Bughrara</i>	141
Integration of perennial ryegrass (<i>L. perenne</i>) genetic maps using gene-associated SNPs	142
<i>A.C. Vecchies, R.C. Ponting, M.C. Drayton, N.O.I. Cogan, K.F. Smith, G.C. Spangenberg and J.W. Forster</i>	142
Construction and comparison of genetic linkage maps of four F1 populations of Italian ryegrass (<i>Lolium multiflorum</i> Lam.)	143
<i>M. Vandewalle</i>	143
Section 3: QTL analysis and trait dissection	145
QTLs for morphogenetic traits in <i>Medicago truncatula</i>	147
<i>B. Julier, T. Huguet, J.M. Prospero, P. Barre, G. Cardinet and C. Huyghe</i>	147
A <i>Medicago truncatula</i> population segregating for aluminum tolerance	148
<i>M. Sledge, B. Narasimhamoorthy and G. Jiang</i>	148
Genetic mapping in tetraploid alfalfa: Results and prospects	149
<i>E.C. Brummer, J.G. Robins, B. Alarcón Zúñiga and D. Luth</i>	149
Quantitative trait locus analysis of morphogenetic and developmental traits in an SSR- and AFLP-based genetic map of white clover (<i>Trifolium repens</i> L.)	150
<i>M.T. Abberton, N.O.I. Cogan, K.F. Smith, G. Kearney, A.H. Marshall, A. Williams, T.P.T. Michaelson-Yeates, C. Bowen, E.S. Jones, A.C. Vecchies and J.W. Forster</i>	150

Changes in gene expression during acclimation to cold temperatures in white clover (<i>Trifolium repens</i> L.) <i>M. Lowe, R.P. Collins and M.T. Abberton</i>	151
QTL analysis of mineral content and grass tetany potential in <i>Leymus wildryes</i> <i>S.R. Larson and H.F. Mayland</i>	152
QTL analysis of mineral content in perennial ryegrass (<i>Lolium perenne</i> L.) <i>N.O.I. Cogan, A.C. Vecchies, T. Yamada, K.F. Smith and J.W. Forster</i>	153
A glucanase gene cosegregates with a QTL for crown rust resistance in <i>L. perenne</i> <i>H. Muylle, J. Baert, E. Van Bockstaele and I. Roldán-Ruiz</i>	154
Mapping water-soluble carbohydrate content in perennial ryegrass <i>L. Turner, J. Gallagher, I. Armstead, A. Cairns and M. Humphreys</i>	155
Quantitative trait loci for vegetative traits in perennial ryegrass (<i>Lolium perenne</i> L.) <i>A.M. Sartie, H.S. Easton, M.J. Faville and C. Matthew</i>	156
Approaches for associating molecular polymorphisms with phenotypic traits based on linkage disequilibrium in natural populations of <i>Lolium perenne</i> <i>L. Sköt, J. Humphreys, I.P. Armstead, M.O. Humphreys, J.A. Gallagher and I.D. Thomas</i>	157
Identification of quantitative trait loci for flowering time in a field-grown <i>Lolium perenne</i> x <i>Lolium multiflorum</i> mapping population <i>R.N. Brown, R.E. Barker, S.E. Warnke, L.A. Brilman, M.A.R. Mian, S.C. Sim and G. Jung</i>	158
Crown rust resistance of Italian ryegrass cultivar 'Axis' to an isolate from Japan <i>T. Kiyoshi, M. Hirata, T. Takamizo, H. Sato, Y. Mano and M. Fujimori</i>	159
Locating, and utilising <i>Festuca pratensis</i> genes for winter hardiness for the future development of more persistent high quality <i>Lolium</i> cultivars <i>M.W. Humphreys, D. Gasiór, A. Kosmala, O.A. Rognli, Z. Zwierzykowski and M. Rapacz</i>	160
QTL analysis of vernalisation requirement and heading traits in <i>Festuca pratensis</i> Huds. <i>Å. Ergon, C. Fang, Ø. Jørgensen, T.S. Aamlid and O.A. Rognli</i>	161
Consistency of QTL for dollar spot resistance between greenhouse and field inoculations, multiple locations, and different population sizes in creeping bentgrass <i>N. Chakraborty, J. Bae, J. Curley, S. Warnke, M. Casler, S. Bughrara and G. Jung</i>	162
Section 4: Genomics, model species, gene discovery and functional analysis	163
Structural and functional genomic research in model legume plants: The National BioResource Project (NBRP) in Japan <i>S. Tsuruta, M. Hashiguchi and R Akashi</i>	165
Identification of putative <i>AtTT2 R2R3-MYB</i> transcription factor orthologues in tanniferous tissues of <i>L. corniculatus</i> var. <i>japonicus</i> cv <i>Gifu</i> <i>D.N Bryant, P. Bailey, P. Morris, M. Robbins, C. Martin and T. Wang</i>	166
Foliar expression of candidate genes involved in condensed tannin biosynthesis in white clover (<i>Trifolium repens</i>) <i>S.N. Panter, J. Simmonds, A. Winkworth, A. Mouradov and G.C. Spangenberg</i>	167
Discovery, isolation and characterisation of promoters in white clover (<i>Trifolium repens</i>) <i>C.M. Labandera, Y.H. Lin, E. Ludlow, M. Emmerling, U. John, P.W. Sale, C. Pallaghy and G.C. Spangenberg</i>	168
Application of molecular markers derived from <i>Medicago truncatula</i> in white clover (<i>Trifolium repens</i> L.) <i>C. Jones and M.T. Abberton</i>	169
Gene-associated single nucleotide polymorphism discovery in white clover (<i>T. repens</i> L.) <i>M.C. Drayton, R.C. Ponting, A.C. Vecchies, T.C. Wilkinson, J. George, N.O.I. Cogan, N.R. Bannan, K.F. Smith, G.C. Spangenberg and J.W. Forster</i>	170
A molecular study of alfalfa megalosporogenesis <i>D. Rosellini, S. Capomaccio and F. Veronesi</i>	171
The efficacy of GeneThresher® methylation filtering technology in the plant kingdom <i>U. Warek, J.A. Bedell, M.A. Budiman, A.N. Nunberg, R.W. Citek, D. Robbins, N. Lakey and P.D. Rabinowicz</i>	172
Screening of perennial grasses and a mutant maize collection by Fourier-Transformed InfraRed (FTIR) spectroscopy for improved biofuel traits <i>S.C. Thain, P. Morris, S. Hawkins, C. Morris and I.S. Donnison</i>	173

A proposal for an international transcriptome initiative for forage and turf: microarray tools for expression profiling in ryegrass, clover and grass endophytes	174
<i>T. Webster, N. Nguyen, C. Rhodes, S. Felitti, R. Chapman, D. Edwards and G.C. Spangenberg</i>	
Isolation and characterisation of genes encoding malate synthesis and transport determinants in the aluminium-tolerant Australian weeping-grass (<i>Microlaena stipoides</i>)	175
<i>R.M. Polotnianka, E. Ribarev, L. Mackin, K.A. Sivakumaran, G.D. Nugent, U.P. John and G.C. Spangenberg</i>	
Novel genotypes of the subtropical grass <i>Eragrostis curvula</i> for the analysis of apomixis (diplospory)	176
<i>S. Cardone, P. Polci, J.P. Selva, M. Mecchia, S. Pessino, P. Voigt, G.C. Spangenberg and V. Echenique</i>	
Discovery and functional categorisation of expressed sequence tags from flowers of <i>Eragrostis curvula</i> genotypes showing different ploidy levels and reproductive modes	177
<i>V. Echenique, S. Felitti, N. Paniego, L. Martelotto, S. Pessino, D. Zanazzi, P. Fernández, M. Díaz, P. Polci and G.C. Spangenberg</i>	
A comprehensive analysis of gene expression and genomic alterations in a newly formed autotetraploid of <i>Paspalum notatum</i>	178
<i>L.G. Martelotto, J.P.A. Ortiz, F. Espinoza, C.L. Quarin and S.C. Pessino</i>	
Gene discovery and molecular dissection of fructan metabolism in perennial ryegrass (<i>Lolium perenne</i>)	179
<i>J. Chalmers, A. Lidgett, X. Johnson, K. Terdich, N. Cummings, Y.Y. Cao, K. Fulgueras, M. Emmerling, T. Sawbridge, E.K. Ong, A. Mouradov and G.C. Spangenberg</i>	
Gene discovery and molecular dissection of lignin biosynthesis in perennial ryegrass (<i>Lolium perenne</i>)	180
<i>A. Lidgett, M. Emmerling, R. Heath, R. McInnes, D. Lynch, A. Bartkowski, K. Fulgueras, T. Sawbridge, E.K. Ong, K.F. Smith, A. Mouradov and G.C. Spangenberg</i>	
An <i>in silico</i> DNA sequence comparison of the perennial ryegrass and rice genomes	181
<i>M.J. Faville</i>	
The identification of genetic synteny between <i>Lolium perenne</i> chromosome 7 and rice chromosome 6 genomic regions that have major effects on heading-date	182
<i>I.P. Armstead, L.B. Turner, L. Skøt, I.S. Donnison, M.O. Humphreys and I.P. King</i>	
Towards understanding photoperiodic response in grasses	183
<i>M. Gagic, I. Kardailsky, N. Forester, B. Veit and J. Putterill</i>	
Controlled flowering project for <i>Lolium perenne</i> at Agresearch: an overview	184
<i>I. Kardailsky, B. Veit, N. Forester, M. Gagic, K. Richardson, M. Faville and G. Bryan</i>	
The investigation of flowering control in late/rare flowering <i>Lolium perenne</i>	185
<i>S. Byrne, I. Donnison, L.J. Mur and E. Guiney</i>	
Isolation of candidate genes involved in cold temperature response in <i>Festuca pratensis</i> Huds., using suppression subtractive hybridisation and microarray approaches	186
<i>H. Rudi, V. Alm, L. Opseth, A. Larsen and O.A. Rognli</i>	
Isolation and characterization of a CBF gene from perennial ryegrass (<i>Lolium perenne</i> L.)	187
<i>Y. Xiong and S. Fei</i>	
Isolation and characterisation of genes encoding ice recrystallisation inhibition proteins (IRIPs) in the cryophilic antarctic hair-grass (<i>Deschampsia antarctica</i>) and the temperate perennial ryegrass (<i>Lolium perenne</i>)	188
<i>U.P. John, R.M. Polotnianka, K.A. Sivakumaran, L. Mackin, M.J. Kuiper, J.P. Talbot, O. Chew, G.D. Nugent, N.O.I. Cogan, M.C. Drayton, J.W. Forster, G.E. Schrauf and G.C. Spangenberg</i>	
Development of genetic markers for drought tolerance in <i>Festuca-Lolium</i> complexes	189
<i>J.P. Wang and S.S. Bughrara</i>	
Monitoring of gene expression profiles and identification of candidate genes involved in drought tolerance in <i>Festuca mairei</i> with cDNA-AFLP	190
<i>J.P. Wang and S.S. Bughrara</i>	
Section 5: Use of molecular markers and bioinformatics in breeding	191
Towards a comparative map of white clover (<i>Trifolium repens</i>) and barrel medic (<i>Medicago truncatula</i>)	193
<i>M. Febrer, G. Jenkins, M. Abberton and D. Milbourne</i>	
Use of cross-species amplification markers for pollen-mediated gene flow determination in <i>Trifolium polymorphum</i> Poiret	194
<i>M. Dalla Rizza, D. Real, R. Reyno and K. Quesenberry</i>	
Clover ASTRA: a web-based resource for <i>Trifolium</i> EST analysis	195
<i>G.C. Spangenberg, T. Sawbridge, E.K. Ong, C.G. Love, T.A. Erwin, E.G. Logan and D. Edwards</i>	

SNP discovery and haplotypic variation in full-length herbage quality genes of perennial ryegrass (<i>Lolium perenne</i> L.)	196
<i>R.C. Ponting, M.C. Drayton, N.O.I. Cogan, G.C. Spangenberg, K.F. Smith and J.W. Forster</i>	
Development and use of a tool for automated alignments of genes in the rice BAC's GenBank card against other species	197
<i>P. Barre, G. Darrieutort, J. Auzanneau and B. Julier</i>	
Screening genes for association with loci for nitrogen-use efficiency in perennial ryegrass by pyrosequencing TM	198
<i>O. Dolstra, D. Dees, J.-D. Driesprong and E.N. van Loo</i>	
Gene-associated single nucleotide polymorphism (SNP) discovery in perennial ryegrass (<i>Lolium perenne</i> L.)	199
<i>J.W. Forster, N.O.I. Cogan, A.C. Vecchies, R.C. Ponting, M.C. Drayton, J. George, J.L. Dumsday, G.C. Spangenberg and K.F. Smith</i>	
Development and testing of novel chloroplast markers for perennial ryegrass from <i>de novo</i> sequencing and <i>in silico</i> sequences	200
<i>S. McGrath, T.R. Hodgkinson and S. Barth</i>	
Ryegrass ASTRA: a web-based resource for <i>Lolium</i> EST analysis	201
<i>G.C. Spangenberg, T. Sawbridge, E.K. Ong, C.G. Love, T.A. Erwin, E.G. Logan and D. Edwards</i>	
Positive effect of increased AFLP diversity among parental plants on yield of polycross progenies in perennial ryegrass (<i>Lolium perenne</i> L.)	202
<i>R. Kölliker, B. Boller and F. Widmer</i>	
Genomic constitution of <i>Festulolium</i> varieties	203
<i>D. Kopecky, V. Cernoch, R. Capka and J. Dolezel</i>	
Genetic changes over breeding generations of <i>Festulolium</i>	204
<i>M. Ghesquière, P. Barre and L. Barrot</i>	
Phenotypic variation within local populations of meadow fescue shows significant associations with allele frequencies at AFLP loci	205
<i>S. Fjellheim, Å.B. Blomlie, P. Marum and O.A. Rognli</i>	
Marker-assisted selection for fibre concentration in smooth brome grass	206
<i>C. Stendal, M.D. Casler and G. Jung</i>	
Endophyte ASTRA: a web-based resource for <i>Neotyphodium</i> and <i>Epichloë</i> EST analysis	207
<i>K. Shields, M. Ramsperger, S.A. Felitti, C.G. Love, T.A. Erwin, D. Singh, E.G. Logan, D. Edwards and G.C. Spangenberg</i>	
Section 6: Genetics and breeding for symbiosis	209
Genetic variation in the perennial ryegrass fungal endophyte <i>Neotyphodium lolii</i>	211
<i>E. van Zijll de Jong, N.R. Bannan, A.V. Stewart, K.F.M. Reed, M.P. Dobrowolski, K.F. Smith, G.C. Spangenberg and J.W. Forster</i>	
Isolation and characterisation of novel BTB domain protein encoding genes from fungal grass endophytes	212
<i>M. Ramsperger, S.A. Felitti, D. Edwards and G.C. Spangenberg</i>	
Genetic analysis of the interaction between perennial ryegrass and the fungal endophyte <i>Neotyphodium lolii</i>	213
<i>E. van Zijll de Jong, A.C. Vecchies, M.P. Dobrowolski, N.O.I. Cogan, K.F. Smith, G.C. Spangenberg and J.W. Forster</i>	
Microarray-based transcriptome analysis of the interaction between perennial ryegrass (<i>Lolium perenne</i>) and the fungal endophyte <i>Neotyphodium lolii</i>	214
<i>S.A. Felitti, P. Tian, T. Webster, D. Edwards and G.C. Spangenberg</i>	
A high-throughput gene silencing approach for studying the interaction between perennial ryegrass (<i>Lolium perenne</i>) and the fungal endophyte <i>Neotyphodium lolii</i>	215
<i>S.A. Felitti, P. Tian, D. Edwards and G.C. Spangenberg</i>	
Metabolome analysis of the interaction between perennial ryegrass (<i>Lolium perenne</i>) and the fungal endophyte <i>Neotyphodium lolii</i>	216
<i>P. Tian, S.A. Felitti, M.P. Dobrowolski, K.F. Smith, D. Edwards, R. Hall, J. Kopka and G.C. Spangenberg</i>	
Endophyte effects on antioxidants and membrane leakage in tall fescue during drought	217
<i>C.P. West, R.D. Carson, C.A. Guerber and B. de los Reyes</i>	

Section 7: Transgenics for research and breeding including risk assessment	219
Role of the BANYULS(<i>BAN</i>) gene from <i>Arabidopsis thaliana</i> in transgenic Alfalfa expression of anthocyanins and proanthocyanidins	221
<i>S.M. Hesamzadeh Hejazi, S. Arcioni and F. Paolucci</i>	
Development of alfalfa (<i>Medicago sativa</i> L.) transgenic plants expressing a <i>Bacillus thuringiensis</i> endotoxin and their evaluation against alfalfa caterpillar (<i>Colias lesbia</i>)	222
<i>F. Ardila, M.C. Gómez, M.J. Diéguez, E.M. Pagano, M. Turica, R. Lecuona, V. Arolfo, D. Basigalup, C. Vázquez Rovere, E. Hopp, P. Franzone and R.D. Rios</i>	
Increased cuticular wax accumulation and enhanced drought tolerance in transgenic alfalfa by overexpression of a transcription factor gene	223
<i>Z.-Y. Wang, J.-Y. Zhang, C. Broeckling, E. Blancaflor, M. Sledge and L. Sumner</i>	
Molecular breeding of white clover for transgenic resistance to <i>Alfalfa mosaic virus</i> and natural resistance to <i>Clover yellow vein virus</i>	224
<i>P. Chu, G. Zhao and G.C. Spangenberg</i>	
Molecular breeding of transgenic virus-immune white clover (<i>Trifolium repens</i>) cultivars	225
<i>M. Emmerling, P. Chu, K.F. Smith, C. Binnion, M. Ponnampalam, P. Measham, Z.Y. Lin, N. Bannan, T. Wilkinson and G.C. Spangenberg</i>	
Polyphenolic phenomena: transgenic analysis of some of the factors that regulate the cell-specific accumulation of condensed tannins (proanthocyanidins) in forage crops	226
<i>M.P. Robbins, G. Allison, D. Bryant and P. Morris</i>	
Minimising bloat through development of white clover (<i>T. repens</i>) with high levels of condensed tannins	227
<i>M.T. O'Donoghue, C. Spillane and E. Guiney</i>	
Production and analysis of transgenic white clover (<i>Trifolium repens</i>) plants over-expressing organic acid biosynthetic genes	228
<i>C.M. Labandera, S. Panter, A. Winkworth, J. Simmonds, A. Mouradov, U. John, P.W. Sale and G.C. Spangenberg</i>	
LXR TM white clover: development of transgenic white clover (<i>Trifolium repens</i>) with delayed leaf senescence	229
<i>Y.H. Lin, J. Chalmers, E. Ludlow, C. Pallaghy, G. Schrauf, Pablo Rush, A.M. García, A. Mouradov and G.C. Spangenberg</i>	
Genetic transformation of rhodesgrass (<i>Chloris gayana</i> Kunth.) by particle bombardment	230
<i>J. Matsumoto, S. Tsuruta, T. Gondo and R. Akashi</i>	
Modulation of the gibberellin content in transgenic turf-type bahiagrass for improved turf characteristics and reduced mowing requirements	231
<i>F. Altpeter, M. Agharkar and H. Zhang</i>	
Inducible over-expression of the CBF3 abiotic stress regulon in transgenic bahiagrass (<i>Paspalum notatum</i> Flugge)	232
<i>V.A. James and F. Altpeter</i>	
Genetic engineering for breeding for drought resistance and salt tolerance in <i>Agropyron</i> spp. (wheatgrass)	233
<i>M. Fugui, Y. Jinfeng and H. Xiuwen</i>	
A novel genotype independent protocol for in vitro plant regeneration from mature seed derived callus of tall fescue (<i>Festuca arundinacea</i> Schreb.)	234
<i>S. Chennareddy, R.V. Sairam and S.L. Goldman</i>	
Efficient <i>in vitro</i> regeneration system from seed derived callus of perennial ryegrass (<i>Lolium perenne</i>) and annual ryegrass (<i>Lolium multiflorum</i>)	235
<i>S. Chennareddy, R.V. Sairam and S.L. Goldman</i>	
Nylon mesh as an improved support for bombarded calli or cell suspensions	236
<i>S.J. Dalton, P. Robson, M. Buanaфина, A.J.E. Bettany, E. Timms, D. Wiffen and P. Morris</i>	
A comparison of hygromycin and paromomycin selection strategies in the genetic transformation of seven <i>Lolium</i> , <i>Festuca</i> , <i>Poa</i> , and <i>Agrostis</i> species	237
<i>S.J. Dalton, P. Robson, M. Buanaфина, A.J.E. Bettany, E. Timms and P. Morris</i>	
Agrobacterium tumefaciens-mediated transformation of perennial ryegrass (<i>Lolium perenne</i> L.)	238
<i>H. Sato, M. Fujimori, Y. Mano, T. Kiyoshi and T. Takamizo</i>	

Manipulating the phenolic acid content and digestibility of forage grasses by targeted expression of fungal cell wall degrading enzymes	239
<i>M.M. de O. Buanafina, P. Morris, T. Langdon, S. Dalton, B. Hauck and H. Porter</i>	
Improving forage quality of tall fescue (<i>Festuca arundinacea</i>) by genetic manipulation of lignin biosynthesis	240
<i>Z.-Y. Wang, L. Chen, C.-K. Auh, A. Hopkins and P. Dowling</i>	
Crown rust resistance in transgenic Italian ryegrass (<i>L. multiflorum</i>) expressing a rice chitinase gene and crosses with cytoplasmic male sterile hybrid ryegrass	241
<i>W. Takahashi, M. Fujimori, Y. Miura, T. Komatsu, S. Sugita, A. Arakawa, Y. Nishizawa, H. Sato, Y. Mano, T. Hibi and T. Takamizo</i>	
Discovery, isolation and characterisation of promoters from perennial ryegrass (<i>Lolium perenne</i>)	242
<i>A. Lidgett, N. Petrovska, J. Chalmers, N. Cummings and G.C. Spangenberg</i>	
Development and field evaluation of transgenic ryegrass (<i>Lolium</i> spp.) with down-regulation of main pollen allergens	243
<i>N. Petrovska, A. Mouradov, Z.Y. Wang, K.F. Smith and G.C. Spangenberg</i>	
Shutting the stable door after the horse has bolted? Risk assessment and regulation for transgenic forages	244
<i>C.J. Pollock</i>	
Assessing the risk posed by transgenic virus-resistant <i>Trifolium repens</i> to native grasslands in Southeast Australia	245
<i>R.C. Godfree, P.W.G. Chu and A.G. Young</i>	
Pollen-mediated gene flow from genetically modified herbicide resistant creeping bentgrass	246
<i>L.S. Watrud, E.H. Lee, A. Fairbrother, C. Burdick, J.R. Reichman, M. Bollman, M. Storm, G. King and P.K. van de Water</i>	
Use of cellular automata modelling approaches to understand potential impacts of GM grasses on grassland communities	247
<i>R. Colasanti, R. Hunt and L.S. Watrud</i>	
Section 8: Genetic diversity, genetic resources and breeding systems	249
The importance of exotic forage germplasm in feeding New Zealand's livestock	251
<i>J. Lancashire</i>	
Application of molecular diversity in a forage grass breeding program	252
<i>A.A. Hopkins and M.C. Saha</i>	
Databases for managing genetic resources collections and mapping populations of forage and related species	253
<i>I. Thomas, H. Ougham and D. Peltier</i>	
The use of molecular markers in genetic variability analysis of a collection of <i>Dactylis glomerata</i> L.	254
<i>R. Costa, G. Pereira, C. Vicente and M.M. Tavares de Sousa</i>	
Genetic diversity in colonial bentgrass (<i>Agrostis capillaris</i> L.) revealed by <i>EcoRI/MseI</i> and <i>PstI/MseI</i> AFLP markers	256
<i>H. Zhao and S. Bughrara</i>	
Genetic diversity in zoysiagrass ecotypes based on morphological characteristics and SSR markers	257
<i>M. Hashiguchi, S. Tsuruta, T. Matsuo, M. Ebina, M. Kobayashi, H. Akamine and R. Akashi</i>	
Utilization of SSR to distinguish alfalfa cultivars	258
<i>G.R. Bauchan, C. He and Z-L. Xia</i>	
Genetic diversity among alfalfa cultivars using SSR markers	259
<i>S. Flajoulot, J. Ronfort, P. Baudouin, T. Hugué, P. Barre, C. Huyghe and B. Julier</i>	
Evaluation of genetic diversity in white clover (<i>Trifolium repens</i> L.) through measurement of simple sequence repeat (SSR) polymorphism	260
<i>J. George, E. van Zijll de Jong, T.C. Wilkinson, M.P. Dobrowolski, N.O.I. Cogan, K.F. Smith and J.W. Forster</i>	
Genetic and phenotypic diversity of Swiss red clover landraces	261
<i>D. Herrmann, B. Boller, F. Widmer and R. Kölliker</i>	
Improving the utilisation of germplasm of <i>Trifolium spumosum</i> L. by the development of a core collection using ecogeographical and molecular techniques	262
<i>K. Ghamkhar, R. Snowball and S.J. Bennett</i>	

Molecular characterization and tissue culture regeneration ability of the USA <i>Arachis pintoi</i> (Krap. and Greg.) germplasm collection	263
<i>M.A. Carvalho, K.H. Quesenberry and M. Gallo-Meagher</i>	
Genetic and molecular characterization of temperate and tropical forage maize inbred lines	264
<i>B. Alarcón-Zúñiga, E. Valadez-Moctezuma, T. Cervantes-Martínez, T. Cervantes-Santana and M. Mendoza</i>	
Random amplified polymorphic DNA analysis in section <i>Pnigma</i> of the genus <i>Bromus</i> L.	265
<i>M. Tuna, O. Barzani, K.P. Vogel and A. Golan-Goldhirsh</i>	
Genetic characterization of prairie grass (<i>Bromus catharticus</i> Vahl.) natural populations	266
<i>R. Sellaro, E.M. Pagano, B. Rosso, P. Rimieri and R.D. Rios</i>	
Analysis of <i>Bromus inermis</i> populations using Amplified Fragment Length Polymorphism markers to identify duplicate accessions	267
<i>V.L. Bradley and T.J. Kisha</i>	
Characterisation of naturalised populations of <i>Thinopyrum ponticum</i> Podp through indexes obtained under saline stress	268
<i>S.M. Pistorale, A.N. Andrés and O. Bazzigalupi</i>	
Genetic structure of Mongolian Wheatgrass (<i>Agropyron mongolicum</i> Keng) in Inner Mongolia of China	269
<i>Y. Jinfeng, Z. Mengli and X. Xinmin</i>	
RFLP analyses of chloroplast DNA of the crested wheatgrasses	270
<i>K.P. Vogel, D.J. Lee and C.A. Caha</i>	
Tracing the origins of Timothy species (<i>Phleum</i> sp.)	271
<i>A.V. Stewart, A. Joachimiak and N. Ellison</i>	
Genetic diversity and heterosis in perennial ryegrass	272
<i>U.K. Posselt</i>	
Population genetics of perennial ryegrass (<i>Lolium perenne</i> L.): differentiation of pasture and turf cultivars	273
<i>M.P. Dobrowolski, N.R. Bannan, R.C. Ponting, J.W. Forster and K.F. Smith</i>	
Analysis of genetic changes in single-variety ryegrass swards	274
<i>C. Straub, G. Boutet and C. Huyghe</i>	
Genetic variability between adapted populations of annual ryegrass (<i>Lolium multiflorum</i> Lam) in Argentina	275
<i>A. Andrés, B. Rosso, J. De Battista and M. Acuña</i>	
Does AFLP diversity reflect consanguinity within meadow fescue breeding material?	276
<i>B. Boller and R. Kölliker</i>	
Genetic diversity in <i>Festuca</i> species as shown by AFLP	277
<i>X.Q. Zhang and S.S. Bughrara</i>	
Analyses of genetic change in grass-clover based systems over time	278
<i>A. Ghesquiere, K. Mehdikhanlov, M. Malengier and J. De Riek</i>	
Keyword index	279
Author index	283