

C O N T E N T S

PART 1

USE OF MUTATION IN BREEDING RESEARCH

Harten, A.M. van, and C. Broertjes Mutation breeding: a stepping stone between Gregor Mendel and genetic manipulation (a treatise for vegetatively propagated crops)	3
Hagberg, A. Induced structural rearrangements	17
Kreft, I. Evaluation and selection of mutations on the basis of their conformity to plant ideotype	37
Harten, A.M. van, and E.C.J. Bal Chemically induced mutations for male sterility in <i>Petunia</i> <i>x hybrida</i>	43
Munck, L., K. Bang-Olsen and B. Stilling Genome adjustment by breeding to balance yield defects in high-lysine mutants of barley	49
Abdel-Hafez, A.G., M.S. El-Keredy and A.A. Bassioni Selection of rust resistant wheat after mutagenesis	61
Denic, M., S. Ratkovic, J. Dumanovic, D. Misevic Use of maize mutants in breeding for improvement of protein quality	65
El-Keredy, M.S., and A.G. Abdel-Hafez Promising rice mutants for developed production	69
Konstantinov, K., M. Denic and V. Sukalovic Cytoplasmic male sterility in maize - nuclear and mito- chondrial genome interdependence	73
Rao, R., M.R. Mogno and M.S. Grillo Genetic studies and inheritance of seed storage protein of pea chromosome mutants	77

PART 2

CYTOGENETICS AND POLYPLOIDY

Cauderon, Y. Cytogenetics in breeding programmes dealing with polyploidy, interspecific hybridization and introgression	83
Krolow, K.-D., and A.J. Lukaszewski Tetraploid triticales - a tool in hexaploid triticales breeding	105

Ramanna, M.S. Instability in tomato lines with the breakage-fusion-bridge cycle	119
Friedt, W. The present status of breeding autotetraploid cereals	123
Schlegel, R., R. Kynast and J.-C. Schmidt Alien chromosome transfer from wheat into rye	129
Cermeno, M.C., B. Friebe, F.J. Zeller and K.-D. Krolow Nucleolar competition in different (A/B)(A/B)RR and DDRR genomes of tetraploid triticales	137
Errico, A., and C. Conicella Identification of interchanges in wild species of <i>Pisum</i>	141
Farcy, E., C. Mousset, D. Maizonnier and A. Cornu Genetic regulation of meiotic recombination in <i>Petunia hybrida</i>	145
Gerdemann, M., and M.D. Sacristán Attempts to transfer resistance to <i>Phoma lingam</i> from <i>Brassica juncea</i> and <i>B. carinata</i> to <i>B. napus</i> through interspecific hybridization followed by ovule culture	149
Hajós-Novák, M., A. Bálint, A.H. Nagy and G. Vida Analysis of ADH1 locus in tetraploid corn / <i>Zea mays</i> L./	153
Hutchinson, J., and J. Postoyko C-banding of <i>Avena</i> species	157
Jaarsma, T.A. A study of nucleic acids in the <i>Symphytum officinale</i> species complex and <i>S. asperum</i> : microdensitometry of nuclear DNA in leaf cells	161
Jouve, N., A. Bernardo, M. García, P. García and C. Soler C-banding and isozyme markers to analyze the segregation of rye chromosomes in the progenies of triticales x wheat hybrids	163
Jung, C., and H. Löptien Breeding nematode-resistant sugar beets	167
Kralj, D., and M. Kump Polyploidy in hop breeding, <i>Humulus lupulus</i> L.	171
Lange, W. Reconstitution of hexaploid wheat from <i>Triticum dicoccoides</i> (AABB, 2n=28) and <i>T. tauschii</i> (DD, 2n=14)	175
Linde-Laursen, I., and R. von Bothmer Preferential loss and gain of specific <i>Hordeum vulgare</i> chromosomes in hybrids with three alien species?	179
Maizonnier, D., A. Cornu, E. Farcy and P. de Vlaming Genetic and cytological maps in <i>Petunia</i>	183

Marrewijk, G.A.M. van, and L.C.J.M. Suurs Biochemical characterization of cytoplasmic male sterility in <i>Petunia hybrida</i>	187
Mastnak-Culk, C., and F. Susnik Cytogenetic studies of the polyploids of hop, <i>Humulus lupulus</i> L.	191
Miazga, D., C. Tarkowski and M. Chrzastek Cytogenetic studies of wheat lines with rye chromosome additions	195
Millet, E., Y. Avivi and M. Feldman Substitution of chromosome 5S ¹ of <i>Aegilops longissima</i> for its group-5 homoeologues of common wheat	199
Roupakias, D.G. Interspecific hybridization between <i>V. faba</i> and <i>V. narbonensis</i> : prospects and limitations	203
Singh, A.K. Alien gene transfer in groundnut by ploidy and genome manipulations (ICRISAT C.P. No. 277)	207
Wang, X. The potential for improving the primary distant hybrids of common wheat by anther culture	211

PART 3

INDUCTION AND USE OF HAPLOIDS

Snape, J.W., E. Simpson, B.B. Parker, W. Friedt and B. Foroughi-Wehr Criteria for the selection and use of doubled haploid systems in cereal breeding programmes	217
Jensen, C.J. Haploid induction and production in crop plants	231
Johansson, L.B. Effects of activated charcoal, cold treatment and elevated CO ₂ -concentrations on embryogenesis in anther cultures	257
Ockendon, D.J. Utilisation of anther culture in breeding Brussels sprouts	265
Bjørnstad, A. The role of linkage and recombination in barley breeding with <i>Hordeum bulbosum</i> L.	273
Bjørnstad, A. Partial incompatibility between scandinavian six-rowed barleys and <i>Hordeum bulbosum</i> L. and its genetical basis	275
Breuer, R., W. Kysely and H.-J. Jacobsen Recent results on somatic embryogenesis in pea and bean	279

Buchter-Larsen, A., and C.J. Jensen Sugar beet (<i>Beta vulgaris</i> L.) pollen quality assessment and effect of irradiation as measured by fluorochromatic reaction and in vitro germination	283
Caligari, P.D.S., W. Powell and J.L. Jinks The detection of linkage using doubled haploids in barley	287
Dieu, P., and M. Beckert The effect of an elevated CO ₂ -concentration in combination with cold treatments in maize (<i>Zea mays</i> L.) anther culture	291
Dumas de Vaulx, R., and D. Chambonnet Obtention of embryos and plants from in vitro culture of unfertilized ovules of <i>Cucurbita pepo</i>	295
Friedt, W., and B. Foroughi-Wehr Agronomic value of androgenetic doubled haploid line as compared to conventionally selected spring barley	299
Hadwiger, M.A., and E. Heberle-Bors Pollen plant production in <i>Triticum turgidum</i> ssp. <i>durum</i>	303
D'Halluin, K., and B. Keimer Production of haploid sugarbeets (<i>Beta vulgaris</i> L.) by ovule culture	307
Keijzer, C.J., H.J. Wilms, A.C. van Aelst and H.B. Leferink-ten Klooster Towards the isolation of sperm cells for androgenic purposes	311
Köhler, F., G. Wenzel, I. Abenthum and H. Glaser Regeneration and selection of isolated microspores of <i>Hordeum vulgare</i>	315
Meynet, J. Possibilities of obtainment and utilization of doubled haploids in <i>Gerbera</i>	319
Niemirowicz-Szczytt, K. Contribution to the studies on the first, generative progeny of <i>Fragaria</i> x <i>Ananassa</i> polyhaploids	323
Powell, W., P.D.S. Caligari and J.L. Jinks A comparison of cross prediction methods in spring barley	327
Prakash, J., and K.L. Giles Androgenesis in oilseed rape	331
Prakash, J., and K.L. Giles Production of doubled haploids in oriental lilies	335
Ryöppy, P., J. Honkanen and P.M.A. Tigerstedt Increasing the efficiency of triticale anther culture	339

Sarrafi, A., R. Ecochard, C. Plancon and M. Ali-Sadiq Genetic gain for some agronomical characters by dihaploid breeding in barley	343
Schmid, J., and E.R. Keller Effect of a gametocide on the induction of haploids in <i>Triticum aestivum</i>	347
Speckman, G.J., J.P.C. van Geyt and M. Jacobs The induction of haploids of sugarbeet (<i>Beta vulgaris</i> L.) using anther and free pollen culture or ovule and ovary culture	351
Swaaaij, A.C. van, and E. Jacobsen Frost tolerant plants obtained from proline accumulating cell lines	355
Uijtewaal, B.A., and W.M. Mattheij Somatic cell genetics of potato. I. Use of monohaploids	359
Zagorska, N.A., M.D. Abadjieva and H.K. Oanh Factors affecting callus and plant production in anther cultures of tomato	361

PART 4

IN-VITRO PROPAGATION

Bornman, C.H., R. Vankova and L.O. Björn Role of methodology in facilitating application of tissue culture techniques	367
Preil, W. In vitro propagation and breeding of ornamental plants: advantage and disadvantage of variability	377
Sink, K.C., L.W. Handley, R.P. Niedz and P.P. Moore Protoplast culture and use of regeneration attributes to select somatic hybrid tomato plants	405
Zenkteler, M., and A. Slusarkiewicz-Jarzina Sexual reproduction in plants by applying the method of test tube fertilization of ovules	415
Becker, U., and G. Reuther Cytogenetic studies in callus cultures of <i>Asparagus</i> off.	425
Malepszy, S., A. Nadolska-Orczyk and W. Orczyk Systems for Regeneration of <i>Cucumis sativus</i> plants in vitro	429
James, D.J., A.J. Passey, K.A.D. MacKenzie, O.P. Jones and E.C. Menhinick Regeneration of temperate fruit trees in vitro via organo- genesis and embryogenesis	433

Ford-Lloyd, B.V., and S. Bhat Problems and prospects for the use of protoplasts in beet breeding	437
Steffen, A., T. Eriksson and O. Schieder Shoot redifferentiation of <i>Agrobacterium</i> transformed- protoplasts and plant tissue - with conventional methods not achievable	441
Jacobsen, H.-J., and W. Kysely Induction of in vitro-regeneration via somatic embryogenesis in pea (<i>Pisum sativum</i>) and bean (<i>Phaseolus vulgaris</i>)	445
Andersen, J.M., F. Okkels, P. Ulskov and J. Marcussen Endogenous cytokinins during embryogenesis in a carrot cell suspension	449
Bhat, S., B.V. Ford-Lloyd and J.A. Callow Tissue and protoplast culture in cultivated beets	453
Eriksen, F.D., C.J. Jensen and P. Olesen Protoplast formation in cereals - an assessment	457
Filippone, E., and T. Cardi Exploitation for breeding of in vitro culture of pea explants	461
Geyt, J.P.C. van, K. Claes, A.H.S. Senanayake and M. Jacobs Some aspects of the in vitro culture of the beet (<i>Beta vulgaris</i> L.)	465
Hyrkäs, K., M. Kivinen and P.M.A. Tigerstedt Interspecific hybridization of red clover (<i>Trifolium pratense</i> L.) with alsike clover (<i>Trifolium hybridum</i> L.) using in vitro embryo rescue	469
Jensen, C.J., A. Buchter-Larsen, D. Cass, E.C. Thörn, K. Engell and P. Olesen Pollen and ovule cultures of barley to isolate, manipulate and transfer sperm cells in in vitro fertilization	473
Jensen, C.J., and E.C. Thörn Strategies in high frequency regeneration from diploid and haploid cell and tissue cultures of barley	477
Linacero, R., and A.M. Vázquez Somaclonal variation in plants regenerated from embryo calluses in rye (<i>Secale cereale</i> L.)	479
Lührs, R., and H. Lörz Somatic embryogenesis, cell and protoplast culture of <i>Hordeum vulgare</i> L. (barley)	483
Marino, G. Isolation and culture of protoplasts from callus and suspension-cultured cells of <i>Prunus cerasus</i> and <i>Actinidia chinensis</i>	487

Moreno, V., L. Zubeldia, B. García-Sogo, F. Nuez and L.A. Roig	491
Somatic embryogenesis in protoplast-derived cells of <i>Cucumis melo</i> L.	
Ruiz, M.L., M.I. Peláez, J. Rueda, F.J. Espino and A.M. Vázquez	495
A comparative study of callus formation and plant regeneration from different explants of <i>Phaseolus vulgaris</i> and <i>Ph. coccineus</i>	
Stolarz, A., and H. Lörz	499
Somatic embryogenesis, cell and protoplast culture of triticale (x <i>Triticosecale</i> Wittmack)	
Zimny, J., and H. Lörz	503
Somatic embryogenesis and plant regeneration from meristematic tissue of <i>Secale cereale</i> (rye)	
Zimny, J., and J.J. Rybczynski	507
Somatic embryogenesis of triticale	

PART 5

SPONTANEOUS AND INDUCED VARIATION FROM IN-VITRO CULTURES

Lörz, H., and P.T.H. Brown	513
Variability in tissue culture derived plants - possible origins; advantages and drawbacks	
Cassells, A.C., M. Coleman, G. Farrell, R. Long, E.M. Goetz and V. Boyton	535
Screening for virus resistance in tissue culture adventitious regenerants and their progeny	
Karp, A.	547
Chromosome variation in regenerated plants	
Walther, F., and A. Sauer	555
In vitro mutagenesis in <i>Gerbera jamesonii</i>	
Novak, F.J., T. Hermelin and S. Daskalov	563
In vitro mutagenesis in maize	
Ahloowalia, B.S.	577
Somaclones of wheat regenerated from primordial leaf callus	
Arcioni, S., D. Mariotti, F. Damiani, M. Pezzotti	581
Somaclonal variation in <i>Lotus corniculatus</i> L.	
Bry, L. de, M. Jacobs, R.M. Wallsgrove and B.J. Mifflin	585
Potential system for the specific selection of plant mutants overproducing methionine	
Collin, H.A., P.D. Putwain and S.C. Giffard	589
Enhancement of asulam resistance in barley	

Cséplö, A., P. Medgyesy and E. Hideg Triazine-resistant <i>Nicotiana</i> mutants from photomixotrophic cell cultures	593
Dekeyser, A., P. Dabin and J. Bouharmont Use of in vitro culture for inducing variation in rice and fuchsia	597
Dirks, R., I. Negrutiu and M. Jacobs Isolation of auxotrophic mutants based on reconstruction experiments with <i>Nicotiana plumbaginifolia</i> protoplasts	599
Fish, N., and A. Karp A study on the effect of different initial culture media on the chromosome stability of <i>Solanum tuberosum</i> cv. Maris Bard protoplast derived regenerants	601
Jong, J. de, and J.B.M. Custers The effect of explant source, in vitro regeneration and irradiation on variation in yield induced in <i>Chrysanthemum morifolium</i>	607
Jørgensen, R.B., and B. Andersen Transfer of genetic material to cultivated barley from alien species through callus culture (preliminary results)	611
Linacero, R., and A.M. Vázquez Somatic embryogenesis and plant regeneration from leaf tissues of <i>Secale cereale</i> L.	615
Li Su Nam and L.E. Heszy Testing of salt (NaCl) tolerance and regeneration in callus culture (n, 2n) of rice	617
Nikova, V.M., and N.A. Zagorska The use of tissue cultures for obtaining tobacco male sterile forms	621
Schinkel, C., and T. Lelley Somaclonal variation in triticales	625
Sjödin, C., and K. Glimelius Separation, identification and biological effects of a toxin produced by <i>Phoma lingam</i>	629
Steen, P., B. Keimer, K. D'Halluin, H.C. Pedersen Variability in plants of sugar beet (<i>Beta vulgaris</i> L.) regenerated from callus, cell-suspension and protoplasts	633
Thörn, E.C., and C.J. Jensen Chromosomal variation in regenerated plants from hybrid callus from crosses between <i>Hordeum vulgare</i> x <i>H. bulbosum</i>	637

PART 6

SOMATIC HYBRIDIZATION AND CYBRIDIZATION

Schieder, O., T. Hein and H. Kohn Plant cell fusion as a tool for genetic manipulation	641
Pelletier, G., C. Primard, F. Vedel and P. Chetrit Genetic improvement of cytoplasmic traits through cytoplasmic hybridization in Cruciferae	653
Glimelius, K., J. Fahlesson, C. Sjödin, E. Sundberg, M. Djupsjöbacka, H. Fellner-Feldegg and H.T. Bonnett Somatic hybridization and cybridization as potential methods for widening of the gene-pools of crops within Brassicaceae and Solanaceae	663
Foulger, D., N. Darrell, N. Fish, S.W.J. Bright and M.G.K. Jones Investigations into the transfer of genetic information be- tween solanaceous species and potato by somatic hybridization	683
Honkanen, J., P. Ryöppi and P.M.A. Tigerstedt Protoplast culture and fusion of red and alsike clover	685
Joshi, C.P., E. Müller-Gensert, A. Steffen, H.Lörz and O. Schieder Interclassical protoplast fusion between orchardgrass and Petunia	689
Medgyesy, P., E. Fejes and P. Maliga Interspecific chloroplast recombination in a Nicotiana somatic hybrid	693
Müller-Gensert, E., and O. Schieder Loss of species-specific sequences in somatic hybrids, obtained by fusion of Nicotiana tabacum CNX protoplasts with heavily X-irradiated N. paniculata protoplasts	697
Pennings, H.M.J., L.J.W. Gilissen and B. de Groot Somatic cell genetics of potato: variant cell lines and somatic hybridization	701
Puite, K.J., and S. Roest Somatic hybridization between two Nicotiana plumbagini- folia lines and between Solanum tuberosum and S. phureja using electrofusion	703
Krüger, I., M. Herbert, R. Wennicke, W. Weigelt, B. Pelzer- Reith, C. Schnarrenberger, T. Amiri and J. Salnikow Structure and regulation of cytosol and plastid specific isoenzymes in higher plants	705
Sundberg, E., and K. Glimelius Resynthesis of Brassica napus via somatic hybridization: a model for production of interspecific hybrids within Brassicaceae	709

Tan, M.M.C., H.S. Boerrigter, A.J. Kool and J.G.T. Hermsen	713
Protoplast culture and plant regeneration of <i>Solanum pennellii</i> and <i>Lycopersicon esculentum</i>	
Vries, S.E. de, E. Jacobsen, M. Tempelaar and M.G.K. Jones	715
Somatic cell genetics of potato III: electrofusion of two amino acid analogue-resistant cell lines	
Primard, C., D. Martin, F. Vedel and G. Pelletier	719
Cp and mt genome constitution of different somatic hybrids between <i>Brassica napus</i> and <i>Brassica hirta</i>	

PART 7

ISOLATION AND CLONING OF PLANT GENES

Apel, K., A. Batschauer and K. Steinmüller	725
The complexity of gene regulation during the lightdependent development of chloroplasts in barley (<i>Hordeum vulgare</i> L.)	
Subramanian, A.R.	731
The chloroplast ribosomes of higher plants and the genes for their protein components	
Flavell, R.B.	745
Genetic variation and gene expression; a study of the ribosomal RNA gene loci of wheat	
Reif, H.J., E. Barzen and H. Saedler	753
Cloning and analysis of two genes for chalcone synthase of <i>Petunia hybrida</i>	
Paz-Ares, J., F. Ponz, P. Rodriguez-Palenzuela, A. Lazaro, C. Hernandez-Lucas, P. Carbonera and F. Garcia-Olmedo	763
CM-proteins and thionins in cereals: characterization and cloning of cDNA	
Blumberg vel Spalve, J., N.S. Shepherd and H. Saedler	771
Cin-DNA-insertions of <i>Zea mays</i>	

PART 8

TRANSFORMATION

Montagu, M. van	775
Recent progress in plant genetic engineering	
Willmitzer, L., A. Blau, P. Eckes, J. Logemann, S. Rosahl, R. Schmidt, J. Sanchez-Serrano and J. Schell	777
Organ-specific gene expression in potato	
Langridge, W.H.R., B.J. Li and A.A. Szalay	785
Electric field mediated transfer of nucleic acid into carrot protoplasts	
Hess, D.	803
The pollen system of gene transfer	

Shillito, R.D., M.W. Saul, J. Paszkowski and I. Potrykus Direct gene transfer to plants	813
Ooms, G., M.M. Burrell, A. Karp, D. Twell and J. Roberts Genetic manipulation in potato	823
Junker, B., B. Baker and H. Lörz Culture and transformation studies with maize protoplasts	827
Webb, K.J. Transformation in the forage legumes	831

PART 9

USE OF MOLECULAR BIOLOGY METHODS FOR PLANT IMPROVEMENT

Schilperoort, R.A. Integration, expression and stable transmission through seeds of foreign genes in plants	837
Grinsven, M.Q.J.M. van, M.A. Haring, J.M. de Haas, H.J.J. Nijkamp and A.J. Kool Identification, cloning and transfer of chloroplast genes of Petunia hybrida	859
Law, C.N. The need for a multidisciplinary approach to genetic manipu- lation in plant breeding	867

APPENDIX	883
List of chairpersons	883
Eucarpia informations	884
List of participants	885
AUTHOR INDEX	895
SUBJECT INDEX	899