

TABLE OF CONTENTS

PREFACE

xxi

ACKNOWLEDGMENTS

xxiii

INTRODUCTION

1. THE PLANT BIOTECHNOLOGY REVOLUTION: WHERE DO WE GO FROM HERE?

A. Altman

1

PLENARY LECTURES

1. PLANT BIOTECHNOLOGY: ACHIEVEMENTS AND OPPORTUNITIES AT THE THRESHOLD OF THE 21ST

I.K. Vasil

9

2. PHARMACEUTICAL FOODSTUFFS: ORAL IMMUNIZATION WITH TRANSGENIC PLANTS

T. Mor and C.J. Arntzen

17

SYMPOSIA

Section A. Basic and Applied Aspects of Growth, Development and Differentiation

1. GENETIC CONTROL OF REGENERATION WAS ALTERED DURING ONE-WEEK RIPENING OF IMMATURE MELON COTYLEDONS ON LIQUID/MEMBRANE SYSTEM

J. Adelberg and J. Chen

21

2. DIFFERENTIAL HORMONAL REQUIREMENTS FOR CLONAL PROPAGATION OF MALE AND FEMALE JOJOBA PLANTS

V. Agrawal, S. Prakash and S.C. Gupta

25

3. SOMATIC EMBRYOGENESIS IN KOREAN *PANAX GINSENG* C.A. MEYER

K.T. Choi, Y.E. and Choi, D.C. Yang

29

4. LEVELS AND *IN SITU* LOCALIZATION OF ENDOGENOUS CYTOKININS AS CHIEF FACTORS CONTROLLING BUD REGENERATION

Chriqui, A. Azmi, A. Guivarc'h, A. Chiappetta, W. Dewitte, J.P. Reynoird, E. Boucheron and H. van Onckelen

33

5. SOMATIC EMBRYO POLARITY IN *DACTYLIS GLOMERATA* AS DETERMINED BY ELECTRON MICROSCOPY

B.V. Conger, A. Vasilenko,

37

6. DUAL EFFECT OF ETHYLENE DURING ROOTING OF APPLE MICROCUTTINGS G-J. De Klerk, A. Paffen, J. Jasik and V. Haralampieva	41
7. TIME-LAPSE TRACKING OF ORIGIN AND DEVELOPMENT OF SOMATIC EMBRYOS IN A GYMNOSPERM, NORWAY SPRUCE L.H. Filonova, P.V. Bozhkov and S. von Arnold	45
8. CONIFER SOMATIC EMBRYO PRODUCTION FROM LIQUID CULTURE P.K. Gupta and R. Timmis	49
9. BASAL NUTRIENT AND HORMONAL REQUIREMENTS FOR DIRECT ORGAN- OGENESIS OF <i>CEDRUS LIBANI</i> A. RICH N. Hosseyni, A. Ozan and Z. Kaya	53
10. AN OVERVIEW ON PROGRESS OF SOMATIC EMBRYOGENESIS IN FOREST TREES S.M. Jain	57
11. GENE EXPRESSION DURING SOMATIC EMBRYOGENESIS IN CARROT SUSPENSION CULTURES Komamine, J. Asami, Y. Endo, Y. Yamanaka, S. Sato, M. Smith, S. Wada, Y. Yanagawa, H. Nakagawa and R. Kawahara.	65
12. PHOTOCONTROL OF SHOOT REGENERATION FROM HYPOCOTYLS OF TOMATO B. Lercari, S. Moscatelli E. Ghirardi, R. Niceforo and L. Bertram.	69
13. FACILITATED INITIATION OF SOMATIC EMBRYOGENESIS IN <i>ARABIDOPSIS</i> <i>THALIANA</i> BY MUTATIONS IN GENES REPRESSING MERISTEMATIC CELL DIVISIONS A.P. Mordhorst, K.J. Voerman, M.V. Hartog, E.A. Meijer, J. van Went, M. Koornneef and S. de Vries.	73
14. AGAROSE-INDUCED EMBRYOID FORMATION IN SUNFLOWER PROTO- PLASTS IS TRIGGERED BY RGD-MEDIATED MEMBRANE-MATRIX ADHESION M. Petitprez, H. Barthou, C. Briere and G. Alibert	77
15. GENE EXPRESSION DIFFERENCES BETWEEN ZYGOTIC AND SOMATIC EMBRYOS MONITORED BY DIFFERENTIAL DISPLAY AND cDNA ARRAY: A POTENTIAL TOOL TO IMPROVE LOBLOLLY PINE SOMATIC EMBRYO QUALITY G.S. Pullman, J. Cairney, N. Xu and X. Feng	81
16. A TOBACCO KNOTTED-1 RELATED HOMEBOX GENE FOR INVESTIGATING <i>IN VITRO</i> SHOOT FORMATION C. Ramage and R. Williams.	85
17. <i>IN VITRO</i> CLONAL PROPAGATION OF ALEPPA PINE (<i>PINUS HALEPENSIS</i>) T. Tzfira, A. Ya'ari, O. Yarnitzky, J. Riov and A. Altman	89

18. NORWAY SPRUCE SOMATIC EMBRYOGENESIS: ENDOGENOUS LEVELS OF PHYTOHORMONES DURING SOMATIC EMBRYO DEVELOPMENT M. Vágner, Z. Vondráková, J. Špačková, M. Cvikrová, J. Eder, H. Lipavská, J. Albrechtová, H. Svobodová and I. Machačková	93
19. MODIFICATIONS OF LEAF MORPHOGENESIS INDUCED BY INHIBITION OF AUXIN POLAR TRANSPORT Z.H. Xu and D.A. Ni	97
20. QUANTITATIVE ANALYSIS OF DOUGLAS-FIR SOMATIC EMBRYOGENESIS C. Zhang, C. Gadgil and W-S Hu	101

Section B. Genetic manipulations: Transformation and Gene Expression, Hybridization, Haploidization and Mutagenesis

1. GENETIC AND MOLECULAR ANALYSIS OF MALE FERTILITY AND CYTOPLASMIC DNA VARIATION IN INTERSPECIFIC <i>SOLANUM</i> SPP. SOMATIC HYBRIDS T. Bastia, N. Scotti, L. Monti, E.D. Earle and T. Cardi	105
2. TRANSGENIC TROPICAL MAIZE WITH <i>cryIab</i> AND <i>cryIac</i> GENES FROM MICROPROJECTILE BOMBARDMENT OF IMMATURE EMBRYOS Bohorova, W. Zhang, P. Julstrum, S. McClean B. Luna, R.M. Brito, L. Diaz, M.E. Ramos, R. Diaz, P. Estanol, R.V. Ordonez, M. Pacheco, C.R. Castillo, M. Salgado and D. Hoisington,	109
3. BY-PASSING JUVENILE STAGE IN GENETIC TRANSFORMATION OF CITRUS PLANTS M. Cervera, J. Juárez, A. Navarro, J.A. Pina, N. Duran-Vila, L. Navarro and L. Peña	115
4. GREEN HAPLOID PLANT PRODUCTION IN DURUM WHEAT BY VARIOUS HAPLO-METHODS H. Chlyah, S. Cherkaoui, N. Saidi, O. Lamsaouri, M. Mdarhri-Alaoui, H. Benkirane, O. Chlyah and O. Amail	119
5. EVALUATION OF GIBBERELLIN 20-OXIDASE AND ROLC GENES FOR DWARFING ORNAMENTAL PLANTS I.S. Curtis, M.R. Davey, P. Hedden, A. Phillips, D. Ward, S.G. Thomas, K.C. Lowe, and J.B. Power	123
6. <i>AGROBACTERIUM</i> -MEDIATED TRANSFORMATION OF <i>PHASEOLUS</i> BEANS W. Dillen, M. Zambre, J. De Clercq, A. Goossens, J. Kapila, E. Vranova, M. Van Montagu and G. Angenon,	127
7. CONTRIBUTIONS OF PROTOPLAST FUSION TO IMPROVEMENT OF BRASSICA CROPS E.D. Earle, T. Cardi, M.H. Dickson, L.N. Hansen, D.W. Heath, J-P. Ren and M. Sigareva	131

8. EXPRESSION OF A CHIMERIC GRAPEVINE STILBENE SYNTHASE GENE IN STABLE WHEAT TRANSFORMANTS S. Fettig and D. Hess	135
9. PROSPECTS FOR THE ISOLATION OF GENES CONTROLLING TREE-SPECIFIC TRAITS BY USING A TRANSPOSON TAGGING APPROACH M. Fladung	139
10. SWEET POTATO (<i>IPOMEA BATATA</i> L.) BIOTECHNOLOGY: PROGRESS AND PERSPECTIVES. R. Garcia, R. Moran, D. Somontes, E. Pimentel, Z. Zaldua, J. Mena, A. Lopez, M. Garcia.	143
11. CYTOPLASMIC DIVERSITY CAUSED BY MITOCHONDRIAL (MT) DNA DYNAMICS AND MT GENE EXPRESSION IN PETUNIA H. Hauschner, V. Yesodi, I. Izhar, Y. Tabib and N. Firon	147
12. SOMATIC HYBRIDS OF <i>SOLANUM TUBEROSUM</i> AND RELATED SPECIES J.P. Helgeson and G.T. Haberlach.	151
13. A NEW AND VERSATILE <i>AGROBACTERIUM</i> -BASED PLANT TRANSFORMATION VECTOR R. Hellens, N. Joyce and P. Mullineaux	155
14. INHERITANCE OF TRANSGENES IN CEREAL PLANTS A. Kluth, D. Becker and H. Lörz	159
15. STUDIES ON THE FUNCTION OF WHEAT PROLYL ISOMERASES IN TRANSGENIC RICE AND WHEAT I. Kurek, R. Dulbergh, P. Christou and A. Breiman	165
16. GA-INDUCED GENE EXPRESSION IN PETUNIA FLOWERS Y. Leitner-Dagan, A. Izhaki, G. Ben-Nissan, A. Borochoy and D. Weiss	169
17. ENGINEERING OF THE PLASTID GENOME: PROBLEMS AND POTENTIAL P. Maliga	173
18. ELECTROFUSION OF FIELD PEA AND LATHRYUS PROTOPLASTS FOR HYBRID DEVELOPMENT J.S. McCutchan, P.J. Larkin, P.A. Stoutjesdijk, E.C.K. Pang and P.W.J. Taylor	177
19. AN EFFICIENT PROTOCOL FOR SOMATIC EMBRYOGENESIS AND ITS USE IN DEVELOPING TRANSGENIC TEA (<i>CAMELLIA SINENSIS</i> (L) O. KUNTZE) FOR FIELD TRANSFER T.K. Mondal, A. Bhattacharya, A. Sood and P.S. Ahuja	181
20. REGENERATION OF ADVENTITIOUS SHOOTS IN PROCESS OF GENETIC TRANSFORMATION T. Orlikowska	185

21. GENERATION OF TRANSGENIC CARNATION PLANTS WITH NOVEL CHARACTERISTICS BY COMBINING MICROPROJECTILE BOMBARDMENT WITH *AGROBACTERIUM TUMEFACIENS* TRANSFORMATION 189
M. Ovadis, A. Zuker, T. Tzfira, A. Aharoni, E. Shklarman, G. Scovel, H. Itzhaki, H. Ben-Meir and A. Vainstein.
22. SEXUAL TRANSFER OF A TRANSGENE (*BAR*) INTO A NON-TRANSFORMED WHEAT GENOTYPE AND CELL-LEVEL SELECTION OF THE MARKER GENE IN MICROSPORE AND ANTHER CULTURE 193
J. Pauk, R. Mihály, R. Hänsch, J. Schulze and R.R. Mendel
23. PROTEASES FOR THE IMPROVEMENT OF PLANT TRANSFORMATION 197
A. Perl, P. Coutos-Tevenot, N. Sahar, R. Gollop, R. Elyasi and M. Boulay
24. PLANT REGENERATION FROM UNINUCLEAR MICROSPORE SUSPENSION CULTURES OF *AESCLUSUS HIPPOCASTANUM* L 201
L. Radojevic, N. Marinkovic, S. Jevremovic and D. Calic
25. SOMATIC CELL HYBRIDIZATION FOR TRANSFER OF DISEASE RESISTANCE IN BRASSICA 205
U. Ryschka, G. Schumann, E. Klocke, P. Scholze and R. Krämer
26. EXPRESSION OF *ARABIDOPSIS THALIANA* ENDO-1,4-BT-GLUCANASE 0F (*CEL1*) IN TRANSGENIC POPLAR 209
Z. Shani, M. Dekel, G. Tsabary, C.S. Jensen, T. Tzfira, R. Goren, A. Altman, and O. Shoseyov,
27. CELLULOSE BINDING DOMAIN INCREASES CELLULOSE SYNTHASE ACTIVITY IN *ACETOBACTER XYLINUM* AND BIOMASS OF TRANSGENIC PLANTS 213
Z. Shani, E. Shpigel, L. Roiz, R. Goren, B. Vinocur, T. Tzfira, A. Altman and O. Shoseyov
28. GENE EXPRESSION IN PLANT-ENDOMYCORRHIZAL FUNGAL COMMUNICATION 219
O. Shaul, G. Sinvany, I. Ginzberg H. Badani,, S. Wininger, B. Ben Dor, N. Ovdar, N. Atzman and Y. Kapulnik
29. DIRECTED FERTILIZATION TO BREED PLANTS FOR TOXIC IONS RESISTANCE DURING POLLINATION 223
B. Tokarev and L. Lozovsky,
30. IDENTIFICATION OF GENES EXPRESSED IN ROOTS AND NODULES OF *LOTUS JAPONICUS* 227
K.J. Webb, L. Skøt, S. Mizen, M. Paniske, B. Jørgensen and M. Nicholson
31. *AGROBACTERIUM* -MEDIATED STABLE TRANSFORMATION OF BARLEY (*HORDEUM VULGARE* L.) 231
H. Wu, A. McCormac, M.C. Elliott, D-F. Chen

32. CHARACTERIZATION OF A POLLEN SPECIFIC GENE AND ITS FUNCTIONAL ANALYSIS IN TRANSGENIC PLANTS 235
G.J. Wullems, F.R.A. Wittink, P. de Groot, J. Derksen, J.A.M. Schrauwen

Section C. Genetic Stability and Instability, Selection and Variability

1. DETECTION OF ECONOMICAL IMPORTANT VARIABILITY IN MICROPROPAGATION 241
A.C. Cassels, S. M. Joyce, R.F. Curry and T.F. McCarthy.
2. ISOLATION OF TISSUE CULTURE-INDUCED POLYMORPHISM IN BANANAS BY REPRESENTATIONAL DIFFERENCE ANALYSIS 245
C.A. Cullis and K. Kunert.
3. GENETIC STABILITY ANALYSIS OF CRYOPRESERVED *PRUNUS FERLENAI* ROOTSTOCK BY RAPD AND AFLP 249
B. Helliot, D. Madur, M. Brison, E. Dirlewanger and M.T. de Boucaud
4. BANANA GERM-PLASM IMPROVEMENT AT RAHAN MERISTEM 251
E. Khayat
5. CYTOCHIMERA DISSOCIATION THROUGH SHOOT-TIP CULTURE OF MIXOPLAID BANANAS 255
N.S. Roux, J. Dolezel and F.J. Zapata-Arias
6. MOLECULAR AND FIELD ANALYSIS OF SOMACLONAL VARIATION IN TRANSGENIC PLANTS 259
F. Sala, A. Arencibia, S. Castiglione, P. Christou, Y. Zheng and Y. Han
7. COMPARATIVE ANALYSIS OF GENOMIC DNA METHYLATION STATUS AND FIELD PERFORMANCE OF PLANT DERIVED FROM EMBRYONIC CALLI AND SHOOT MERISTEMATIC CULTURES 263
S. Zhang, Sh. Zhang, M.J. Cho, P. Brigitzer and P.G. Lemaux

Section D. Regulation of Primary and Secondary Metabolism

1. INDUCTION OF PPO IN *SEMPERVIVUM* L. 269
V. Abram, M. Donko and A. Štepec
2. T-DNA AND "GAIN OF FUNCTION" TOBACCO MUTANTS WITH ALTERED THREONINE METABOLISM 273
R. Amir, H. Karchi, L. Yang, A. Perl and G. Galili.
3. ACYLATED ANTHOCYANINS FROM CARROT CELL CULTURES: BIOSYNTHESIS AND SPECIFICITY OF THE ACYLATION REACTIONS 277
D.C. Baker, J.L. Clark, and D.K. Dougall

4. BIOSYNTHESIS OF BT-THUJAPLICIN WITH THE <i>CUPRESSUS LUSITANICA</i> SUSPENSION CELL CULTURE K. Fujita, T. Yamaguchi and K. Sakai	281
5. BIOCHEMICAL AND MOLECULAR BASES OF THE CARBON FLUX REGULATION BETWEEN THREONINE AND METHIONINE IN PLANTS B. Gakière, G. Curien, S. Ravanel, V. Verne, M. Droux, J. Yaxley, R. Douce and D. Job.	285
6. EXPRESSION OF SOYBEAN VEGETATIVE STORAGE PROTEINS (VSP α) IN TOBACCO LEAVES D. Guenoune, R. Amir, S. Wolf, S. Wininger, H. Badani, B. Ben-Dor and S. Galili	293
7. OVEREXPRESSION OF L-PHENYLALANINE AMMONIA-LYASE AND CINNAMATE 4-HYDROXYLASE IN TOBACCO CELL SUSPENSION CULTURES P. Howles, S. Masoud, J. Blount, S. Rasmussen, C. Lamb and R.A. Dixon	297
8. MANIPULATING ESSENTIAL AMINO ACID METABOLISM IN PLANTS M. Jacobs, V. Frankard, M. Vauterin, E. Suharyanto and J. Tadesse	303
9. A 28-kDa POD STORAGE PROTEIN OF <i>PHASEOLUS VULGARIS</i> : CHARACTERIZATION, INDUCED ACCUMULATION AND DEGRADATION T. Minamikawa, P-Y Zhong and D. Yamauchi	307
10. REGULATION OF LYSINE CATABOLISM IN PLANTS D. Miron, G. Tan g, H. Karchi, A. Schupper, S. Ben-Yaacob and G. Galili	311
11. REGULATION OF HIGHER PLANT LEAF AND RESERVE TISSUE STARCH SYNTHESIS J. Preiss, M.A. Ballicora, Y. Fu, J. Sheng and M. Wu	315
12. PLANT METABOLISM OF ORGANIC XENOBIOTICS: STATUS AND PROSPECT OF THE 'GREEN LIVER' CONCEPT H. Sandermann	321
13. APPLICATION OF BIOREACTOR FOR THE PRODUCTION OF SAPONIN BY ADVENTITIOUS ROOT CULTURES IN <i>PANAX GINSENG</i> J.H. Seon, K.W. Yoo, Y.Y. Cui, M.H. Kim, S.J. Lee, S.H. Son and K.Y. Paek	329
14. STIMULATION OF BIOACTIVE FLAVONOID PRODUCTION IN SUSPENSION AND BIOREACTOR-BASED CELL CULTURES M.A.L. Smith and M.F. Pépin	333
15. EXPRESSION OF ANTISENSE mRNA FOR ACID INVERTASES IN TRANSGENIC CARROT ALTERS PLANT DEVELOPMENT AND SUCROSE PARTITIONING G-Q Tang and A. Sturm	337
16. ISOCHORISMATE SYNTHASE cDNA ISOLATION FROM CELL CULTURES OF <i>CATHARANTHUS ROSEUS</i> G.J. Wullems, L. van Tegelen, M. Stalman, T. Croes, P.R.H. Moreno and R. Verpoorte	341

17. THE BIOSYNTHETIC RELATIONSHIP BETWEEN LITTORINE AND HYOSCYAMINE IN *DATURA STRAMONIUM* 347
I. Zabetakis, C.W. Wong, R. Edwards and D. O'Hagan

Section E. Model Systems: Cell Cycle, Transport and Signal Transduction

1. CHARACTERIZATION OF A NOVEL FAMILY OF CALMODULIN-BINDING PLASMA MEMBRANE CHANNEL-LIKE PROTEINS 351
T. Arazi and H. Fromm
2. IDENTIFICATION OF NOVEL CELL CYCLE GENES IN *ARABIDOPSIS THALIANA* 355
S. Burssens L. De Veylder, M. Van Montagu and D. Inzé
3. CELL-TO -CELL MOVEMENT OF TOBACCO MOSAIC VIRUS 359
V. Citovsky
4. THE ROLE OF *PASTICCINO1*, AN FKBP-LIKE PROTEIN, IN PLANT DEVELOPMENT 365
R.J. Cowling, P. Vittorioso, J-D. Faure, M. Caboche and C. Bellini
5. THE FORMATION OF THE PLANT VACUOLAR SYSTEM 369
A. da Silva Conceicao, D. Marty-Mazars, N.V. Raikhel and F. Marty.
6. SIGNALS AND THEIR TRANSDUCTION IN EARLY PLANT EMBRYOGENESIS 373
S. de Vries
7. ATTAINMENT OF BILATERAL SYMMETRY IN MONOCOTS: INFLUENCE OF AUXIN POLAR TRANSPORT 383
Ch. Fischer and G. Neuhaus
8. EXPRESSION OF CELL DIVISION CYCLE RELATED GENES IN *BETA-VULGARIS* L. STORAGE ORGANS AND CELLS IN SUSPENSION CULTURES 389
M.R. Fowler, M.J. Kirby, A.I. Atanassova, N.W. Scott, A. Slater and M.C. Elliott
9. THE PLANT ENDOPLASMIC RETICULUM AND QUALITY CONTROL OF SECRETORY PROTEINS 393
L. Frigerio and A. Vitale
10. STUDIES ON SYMBIOTIC OF PROPERTIES OF PURINE AUXOTROPHS OF STRAIN RMD 201 OF *RHIZOBIUM MELILOTI* 397
S. Gupta, S.P.S. Khanuja, A. Singh and N. Prakash
11. DEGRADATION OF POSTTRANSLATIONALLY UNSTABLE PROTEINS IN TRANSGENIC PLANTS UTILIZES MULTIPLE PATHWAYS TO THE VACUOLE 401
E.M. Herman, M.J. Chrispeels, B.A. Larkins and G. Galili

12. THE UPTAKE AND DISTRIBUTION OF [¹⁴ C]DNC-NAA IN ISOLATED COTYLEDONS OF CUCUMBER (<i>CUCUMIS SATIVUS</i> L.) <i>IN VITRO</i>	407
M. Klemš, M. Truksa, L. Havel and S. Procházka	
13. NUCLEAR IMPORT OF THE CAPSID PROTEIN OF TOMATO YELLOW LEAF CURL VIRUS (TYLCV) IN PLANT CELLS	411
T. Kunik, K. Palanichelvam, L. Mizrachy, H. Czosnek, V. Citovsky and Y. Gafni	
14. NOVEL WHEAT MOLECULAR CHAPERONES BELONGING TO THE P ₁ PLASE-FKBP FAMILY: STUDIES ON THEIR REGULATION, TISSUE SPECIFICITY	417
I. Kurek, N. Erel, C. Mayer, E.M. Herman and A. Breiman,	
15. REGULATION OF PROGRAMMED CELL DEATH IN CULTURED SOYBEAN CELLS BY A CYSTEIN PROTEASE INHIBITOR	421
A. Levine, B. Belinghi, M. Solomon, E. Menachem and M. Delledone	
16. POLYADENYLATION AND DEGRADATION OF mRNA IN THE CHLOROPLAST	425
I. Lisitsky and G. Schuster,	
17. FACTORS AFFECTING CELL DIVISIONS IN PLANT CELLS	429
T. Nagata, S. Ishida, S. Nagata and Y. Takahashi	
18. CELLULAR INTEGRATION OF AUXIN AND LIGHT SIGNALS DURING WHEAT SOMATIC EMBRYOGENESIS	433
A. Nato, C. Fresneau, J. De Buyser, D. Laverigne, G. Ducreux and Y. Henry,	
19. A MULTI-PARAMETER APPROACH FOR THE STUDY OF <i>IN VITRO</i> PHOTOSYNTHESIS	437
A. Rival, K. Triques, T. Beulé, A. Nato, D. Laverigne, J. Santamaria, J.L. Verdeil, V. Hoher, C. Oropeza and S. Hamon	
20. PLANT D-TYPE (CYCD) CYCLINS AND THE PLANT CELL CYCLE	441
D.A. Sorrel, C. Riou-Khamlichy, N. Chaubet- Gigot, B. Combettes, C. Gigot and J.A.H. Murray	
21. GENETIC BIOCHEMICAL ANALYSIS OF <i>ARABIDOPSIS</i> SPY	445
T. Thornton, L. Krepel, G. Hart and N. Olszewski	

Section F. Biotechnology for Plant Protection: Abiotic and Biotic Stress

1. GENETIC ENGINEERING OF DISEASE RESISTANCE IN APPLE FRUIT CULTIVARS AND ROOTSTOCKS	449
H.S. Aldwinckle, J.L. Norelli, J.P. Bolar, K. Ko, G.E. Harman and S.K. Brown	
2. BARLEY TRYPSIN INHIBITOR CME CONFERS INSECT RESISTANCE TO WHEAT	453
F. Altpeter, I. Diaz, H. McAuslane, K. Gaddour, P. Carbonero and I.K. Vasil	

3. SALT TOLERANCE AND OXIDATIVE STRESS AS STUDIED BY THE REGULATION OF PHOSPHOLIPID HYDROPEROXIDE GLUTATHIONE PEROXIDASE IN SALT-SENSITIVE AND SALT-TOLERANT CITRUS CELLS 457
O. Avsian-Kretchmer, Y. Gueta-Dahan, Y. Eshdat and G. Ben-Hayyim
4. CALLUS FROM THE RESURRECTION PLANT *CRATEROSTIGMA. PLANTA GINEUM* IS A VERSATILE TOOL TO STUDY ABA-MEDIATED GENE EXPRESSION 461
D. Bartels
5. EXPRESSION OF FUNGAL CHITINOLYTIC ENZYMES IN TRANSGENIC APPLES CONFERS HIGH LEVELS OF RESISTANCE TO SCAB 465
J.P. Bolar, J.L. Norelli, G.E. Harman and S.K. Brown and H.S. Aldwinckle
6. ISOLATION AND EXPRESSION OF A NADPH-DEPENDENT REDUCTASE GENE ABLE TO DETOXYFY THE *EUTYPA LATA* TOXIN IN GRAPEVINE 469
S. Dalmayrac, S. Colrat, P. Guillén, M. Guis, G. Martínez-Reina, C. Deswarte, M. Bouzayen, J.P. Roustau, J. Fallot, J.C. Pech, A. Latché
7. INDUCED DEFENSE MECHANISMS IN PLANT-FUNGUS INTERACTIONS IN CULTURE: DIFFERENCES BETWEEN CELLS IN CULTURE AND LEAF TISSUE 473
S. Dorey, M. Kopp, B. Fritig and S. Kauffmann
8. SELECTION OF HERBICIDE RESISTANT CELL LINES AND SUBSEQUENT IDENTIFICATION OF HERBICIDE TARGETS 477
J. Freitag, F. Schmidt, H.D. Pohlenz, R. Walden and R. Höfgen
9. HERBICIDE TOLERANCE IN CROPS: A TOOL AND A COMMERCIAL REALITY 481
G. Freyssinet and D. J. Cole
10. IDENTIFICATION OF REGULATORY AND METABOLIC GENES ASSOCIATED WITH LEAF SENESCENCE 487
T. Hajoug and S. Gepstein
11. RESISTANCE TO GLYPHOSATE IN A POPULATION OF *LOLIUM RIGIDUM* 491
T.R. Hawkes, D.F. Lorraine-Collwill, P.H. Williams, S.A.J. Warner, P.B. Sutton, S.P. Powles and C. Preston
12. MOLECULAR IDENTIFICATION OF HERBICIDE TARGETS APPLYING TRANSGENIC APPROACHES IN TISSUE CULTURE 495
R. Hoefgen
13. TRANSFORMATION OF CROPS TO HERBICIDE-RESISTANCE AND THEIR USE AGAINST PARASITIC WEEDS 499
D.M. Joel, D. Aviv, T. Surov, V. Portnoy, T. Goldman-Guez and J. Gressel
14. DIFFERENT RESPONSES BETWEEN ANTHOCYANIN PRODUCING AND NON-PRODUCING CELL CULTURES OF *GLEHNNIA LITORALIS* TO STRESS 503
Y. Kitamura, M. Ohata, T. Ikenaga and M. Watanabe

15. GALAXY LINES TRANSGENIC FOR ATTACIN E AND T4 LYSOENZYME GENES
HAVE INCREASE RESISTANT TO FIRE BLIGHT 507
K. Ko, J.L. Norelli, S.K. Brown, H.S. Aldwinckle and K. During.
16. THE HEAT INDUCED INACTIVATION OF THE HERBICIDE RESISTANCE GENE
PAT ISOLATED FROM *STREPTOMYCES VIRIDCHROMOGENES* DEPENDS ON
ITS DNA SEQUENCE 513
S. Kohne, K. Neumann and I. Broer
17. PHYSIOLOGICAL MARKERS FOR SALINITY TOLERANCE IN PLANTS 517
A. Läuchli
18. EXPRESSION OF ROTAVIRUS PROTEINS IN TRANSGENIC PLANTS 521
T.S. Mor, L.J. Richter and H.S. Mason
19. MANIPULATING OXIDATIVE STRESS RESPONSES USING TRANSGENIC
PLANTS: SUCCESSES AND DANGERS 525
P. Mullineaux and G. Creissen
20. TRANSFORMATION OF TOBACCO AND ASPEN PLANTS WITH THE *ITA*
LOCUS OF AN INCQ PLASMID CONFERS RESISTANCE TO *AGRO-*
BACTERIUM TUMEFACIENS INFECTION 533
M. Ovadis, L. Chernin, T. Tzfira, V. Canaan, A. Aharoni, D. Sakar, A. Altman and
A. Vainstein
21. GROWTH CHARACTERISTIC CHANGES DURING SALINITY ADAPTATION OF
THE WILD TOMATO SPECIES *L. PENNELII* 537
A. Rus, S. Rios, E. Olmos and M.C. Bolarin
22. BIOCHEMICAL CHARACTERIZATION OF THE Pto PROTEIN KINASE CONFER-
RING SPECK DISEASE RESISTANCE IN TOMATO 541
G. Sessa, M. D'Ascenzo, and G. Martin
23. *IN VITRO* ELIMINATION OF PRUNUS NECROTIC RINGSPOT VIRUS IN A PLUM
CULTIVAR 545
S. Spiegel, Y. Tam, A. Rosner, M. Brison, B. Helliott, A. Pierronnet, J.P. Eyquard and
M.T. de Boucaud.
24. RESISTANCE TO TOMATO SPOTTED WILT VIRUS IN TRANSGENIC TOMATO
VARIETIES 549
P. Stoeva, D. Hristova, P. Donkova, M. Petrova, N. Gorinova, M. Yankulova, D. Inzé,
W. van Kamp and A.I. Atanassov
25. *ARABIDOPSIS THALIANA* IN CULTURE : A POWERFUL TOOL TO DECIPHER
THE MODE OF ACTION/TARGET SITES OF HERBICIDES WITH ANTIMETA-
BOLITE ACTIVITY 553
M.V. Subramanian, E.W. Walters, O. Lyzwanski and D. Siehl,
26. PRODUCTION OF POTATO GENOTYPES WITH RESISTANCE TO POTATO
VIRUS Y (PVY) BY BIOTECHNOLOGICAL METHODS 557
R. Thieme, T. Gavrilenko T. Thieme and U. Heimbach

27. PLANT TOLERANCE TO WATER AND SALT STRESS: THE EXPRESSION PATTERN OF A WATER STRESS RESPONSIVE PROTEIN (BspA) IN TRANSGENIC ASPEN PLANTS 561
W. Wang, T. Tzfira, N. Levin, O. Shoseyov and A. Altman

Section G. Biotechnology for Crop Improvement: Yield, Quality and Production of Valuable Substances

1. EXPRESSION OF RECOMBINANT ANTIBODIES IN PLANTS AND CELL SUSPENSION CULTURES 567
R. Fischer, J. Drossard, S. Hellwig, N. Emans, and S. Schillberg
2. BIOTECHNOLOGICAL APPROACHES TO MAKING VACCINE IN PLANTS 571
J. Kapusta, A. Modelska, M. Figlerowicz, I. Podkowinski, T. Pniewski, O. Lisowa, P. Berbezy, D. Helias, J. Biesiadka, I. Femiak, M. Letellier, V. Yusibov, A. Plucienniczak, H. Koprowski and A.B. Legocki
3. GENETIC ENGINEERING OF SEED OIL FATTY ACID COMPOSITION 575
D.S. Knutzon, G.M. Chan, P. Mukerji, J.M. Thurmond, S. Chaudhary and Y-S Huang
4. ENGINEERING CARBOHYDRATE METABOLISM IN TRANSGENIC PLANTS 579
J. Kossmann, J. Lloyd, J.Riesmeier and L. Willmitzer
5. GENETIC MANIPULATION FOR THE PRODUCTION OF HIGH LYSINE CORN 583
B.A. Larkins, X. Wang, Y. Sun, P. Hughes and A.M. Clore
6. ETHYLENE, POLYAMINE AND FRUIT RIPENING 591
R.A. Mehta, A. Handa and A.K. Mattoo
7. HOW GENES PAINT FLOWERS 597
J. Mol, E. Grotewold and R. Koes
8. BIOSYNTHESIS OF SCENT AND FLAVOR COMPOUNDS 601
E. Pichersky, N. Dudareva, J. Wang, L. Cseke and E. Lewinsohn.
9. IMPROVING THE OXIDATIVE STABILITY OF CORN AND SOYBEAN OILS BY GENETIC MODIFICATION 605
B. Shen, A.J. Kinney, and W.D. Hitz
10. THAUMATIN EXPRESSION IN TRANSGENIC CUCUMBER PLANTS 609
M. Szwacka, M. Krzymowska, and S. Malepszy
11. MOLECULAR BREEDING OF FLOWER COLOR OF *TORENIA HYBRIDA* 613
S. Tsuda, K. Suzuki, X-M. Xue, Y. Tanaka, Y. Fukui, M. Mizutani, Y. Katsumoto and T. Kusumi
12. NUTRITIONAL QUALITY IMPROVEMENT OF SORGHUM THROUGH GENETIC TRANSFORMATION 617
T. Yohannes, V. Frankard, L. Sagi, R. Swenen and M. Jacobs

13. SUPER-RUBISCO FOR IMPROVEMENT OF PHOTOSYNTHETIC PERFORMANCES OF PLANTS 621
A. Yokota, K. Uemura and H. Kobayashi

Section H. Novel Micropropagation Methods

1. QUALITY ISSUES IN A TISSUE CULTURE LABORATORY 625
P.C.A. Debergh
2. TEMPORARY IMMERSION FOR PLANT TISSUE CULTURE 629
E. Etienne, C. Teisson, D. Alvard, M. Lartaud, M. Berthouly, F. Georget, M. Escalona, and J.C. Lorenzo
3. ROBOTIC MICROPROPAGATION FOR COMMERCIAL FORESTRY 633
J.R. Gorst and R.D. Teasdale
4. DESIGN CONSIDERATIONS FOR A MECHANIZED MICROPROPAGATION LABORATORY 637
A. Gross, R. Levine
5. QUALITY FROM A YOUNG PLANT PERSPECTIVE 643
G. Hennen
6. DEVELOPMENT OF NEW PLANT TISSUE CULTURE MEDIA 647
M. Henry, C. Fulcheri and P. Morard
7. ENVIRONMENTAL CONTROL IN MICROPROPAGATION: EFFECT OF CO₂, ENRICHMENT AND SUPPORTING MATERIAL ON GROWTH AND PHOTOSYNTHESIS OF EUCALYPTUS SHOOTS/PLANTLETS CULTURED PHOTOAUTOTROPHICALLY *IN VITRO* 651
C. Kirdmanee
8. ENVIRONMENTAL CONTROL IN PHOTOAUTOTROPHIC MICROPROPAGATION – A REVIEW 655
T. Kozai, Q. T. Nguyen and C. Chun
9. PHOTOAUTOTROPHIC MICROPROPAGATION OF TROPICAL PLANTS 659
Q. T. Nguyen, T. Kozai, K.L. Nguyen and U.V. Nguyen
10. MECHANIZATION OF MICROPROPAGATION 663
A.A. Watad, Y. Alper, R. Stav and R. Levin.
11. SURPRISING MICROPROPAGATION TOOLS 667
S.P.O. Werbrouck, K. Goethals, M. Van Montagu and P.C.A. Debergh
12. ORGANOGENIC PLANT REGENERATION IN BIOREACTORS 673
M. Ziv

Section I. New Markets and Commercial Applications

1. PLANT TISSUE CULTURE INDUSTRY IN THE MIDDLE EAST, AN OVERVIEW 677
Abo El Nil, M., and Ilan, A.
2. INTEGRATION THROUGH *IN VITRO* CULTURE 681
M. Alonso, E. Gisbert and M. Borja
3. COMMERCIAL NEEDS AND CREATING NEW MARKETS IN EASTERN EURO-
PEAN COUNTRIES 685
A.I. Atanassov, L. Antonov and T. Twardowski.
4. EARLY RESEARCH AND COMMERCIAL USE OF *IN VITRO* PLANT PROPAGA-
TION IN ISRAEL 689
J. Ben-Jaacov
5. THE APPLICATION OF PLANT BIOTECHNOLOGY IN DEVELOPING COUN-
TRIES ON THE AFRICAN CONTINENT 693
J.A. Brink, B. Woodward and E.J. DaSilva
6. COMMERCIAL MICROPROPAGATION IN THE UNITED STATES, 1965-1998 699
R.D. Hartman and R.H. Zimmerman
7. SECURING COST-EFFECTIVE PRODUCT QUALITY, AN ESSENTIAL FOR
SUSTAINABLE BUSINESS 709
D.P. Holdgate and E.A. Zandvoort
8. SCOPE OF THE TISSUE CULTURE INDUSTRY IN INDIA 713
A.F. Mascarenhas
9. COMMERCIALIZATION OF TISSUE CULTURE FOR FORESTRY TREES SPECIES
IN INDIA 721
R.S. Nadgauda, S.V. Kendurkar and A.F. Mascarenhas
10. INVOLVEMENT OF BIOTECHNOLOGY IN COMMERCIAL PLANT TISSUE
CULTURE 725
B.N. Okole, C. Memela, S. Rademan, V. Chibba, K. Kunert, C.A. Cullis
11. THE POSSIBILITIES OF COMMERCIALIZATION OF INDIAN ORCHIDS :
APPLICATION OF TISSUE CULTURE TECHNIQUES 729
S.P. Vij

Section J. Intellectual Property Rights

1. TRANSGENIC RICE, DEVELOPMENT, PRODUCTS, ACCEPTANCE AND
ECONOMIC IMPACT. 737
S.K. Datta

2. INTELLECTUAL PROPERTY PROTECTION FOR PLANT TECHNOLOGIES E. A. Figg	741
3. PLANT BREEDER'S RIGHTS AND PLANT BIOTECHNOLOGY R.J. Jondle	747
4. GENETICALLY MODIFIED CROPS IN EUROPEAN UNION - THE REGULATORY FRAMEWORK AND PUBLIC ACCEPTANCE A. Koenig	751
5. DEMYSTIFYING THE GENETIC ENGINEERING OF PLANTS: TALKING BIO- TECHNOLOGY IN THE COMMUNITY P.G. Lemaux	757
6. LEGISLATION AND PUBLIC PERCEPTION OF BIOTECHNOLOGY IN POLAND T. Twardowski	761
<i>AUTHOR INDEX</i>	765