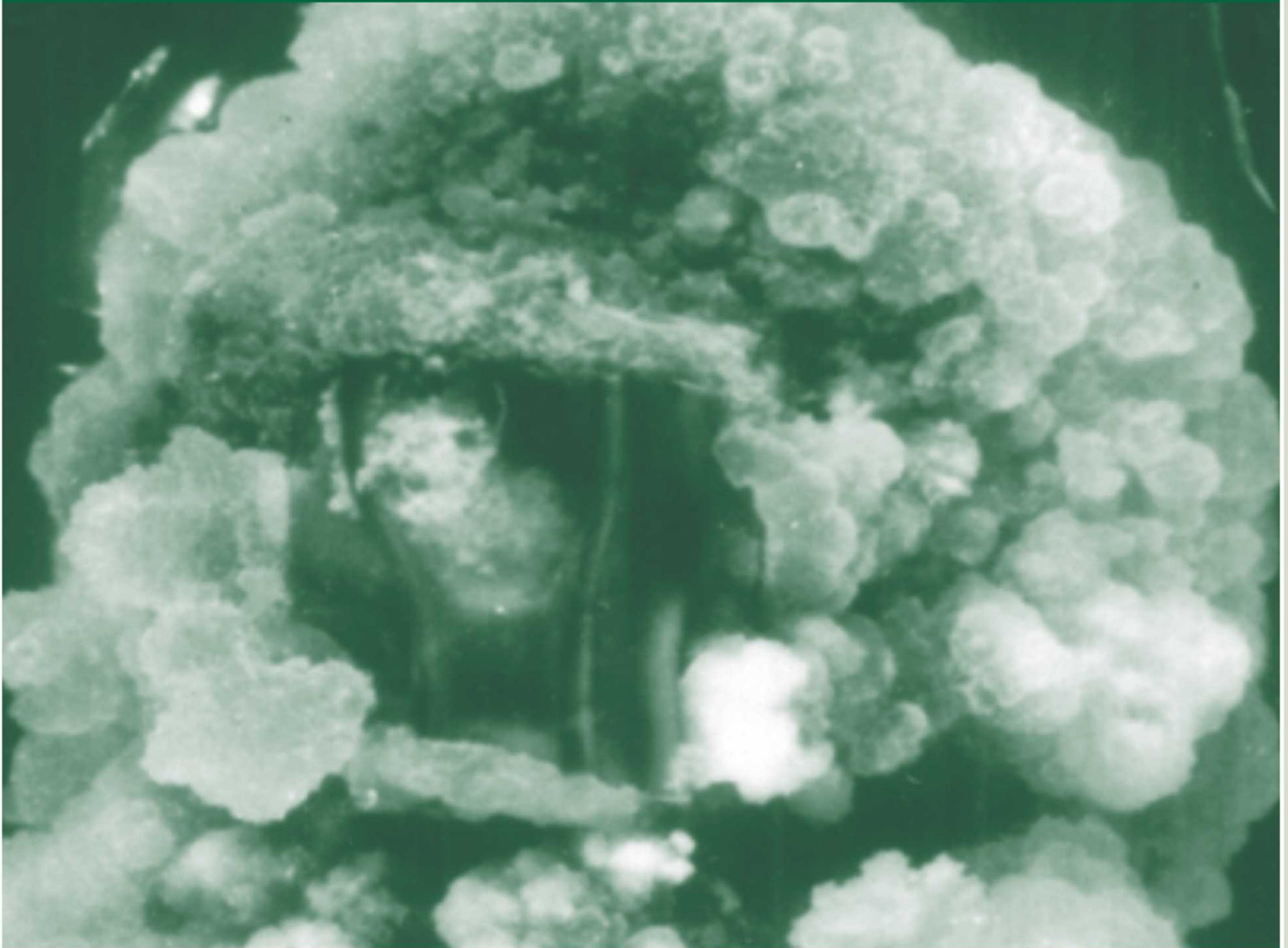


L. K. Pareek



Trends in Plant Tissue Culture and Biotechnology

Trends in Plant Tissue Culture and Biotechnology

Editor

L.K. PAREEK

Laboratory of Plant Tissue Culture
and Experimental Morphogenesis
Department of Botany
Rajasthan University, Jaipur 302 001 (India)

Associate Editor

DR. P. L. SWARNKAR

Department of Botany
Rajasthan University
Jaipur 302 001 (India)



AGROBIOS (INDIA)

Published by:
Agrobios (India)
Agro House, Behind Nasrani Cinema
Chopasani Road, Jodhpur 342 002
Phone: 91-0291-2642319, Fax: 2643993
E. Mail: agrobiosindia@gmail.com
www.agrobiosindia.com



Agrobios (India)

First Edition 1998
Reprinted 1999
Reprinted 2003
Reprinted 2004

©2004, Agrobios (India), Jodhpur
All rights reserved. No part of the book or part thereof, including the title of the book, be reprinted in any form or language without the written permission of the author and the publishers. The copyists shall be prosecuted.

ISBN: 81-87167-215-X

Price: Rs. 990.00/US\$ 65.00

Published by: Dr. Updesh Purohit for Agrobios (India), Jodhpur
Laser typeset at: Yashee Computers, Jodhpur
Cover Design by: Reena
Printed at: Chopra Printing Press. Jodhpur

Preface

Plant Cell and tissue Culture has become major tool in the study of an increasing number of fundamental and applied programmes in the Plant science. Its increasing use to investigate Cell and Developmental Biology, Biochemistry, Physiology, Genetics and Molecular Biology is providing new knowledge about fundamental characteristic of plants. Furthermore, it has become an integral part of *Plant Biotechnology* research as scientists in various universities, research institutions and number of private companies pursue the development of improved plants for agriculture, horticulture and forestry.

The National symposium on recent advances in Plant Tissue Culture and Biotechnology was held in December 1994 at the University of Rajasthan, Jaipur to provide a comprehensive national forum for discussion of the latest developments in this rapidly growing field. More than 300 participants attending the symposium from various universities, research institutes and companies from all over the country provided clear evidence that research in this field has expanded rapidly in the last about two decades. a total of 70 scientific papers and more than 150 posters covering virtually all aspects of current research in the field were presented. The number of developments reported in these presentations and the chapters in this volume clearly indicate that the technology is moving forward on a broad front. O particular significance has been the development of gene transfer technology and the rapidly expanding investigation of the molecular biology of plants in the recent years.

The content of this volume reflects the organization of the symposium which was divided into broad subjects areas. These subjects were discussed at length in concurrent sessions. The chapters in the volume were written by leading experts in the field. Some of the chapters will provide the reader with a broad review of recent developments and progress in the field of tissue culture. It is hoped that the wide range of authoritative reviews and views presented by the authors in this volume will provide a useful and exciting stimulus to researchers and students in the field.

The generous financial support given to the symposium by University Grants Commission of India, Department of Science, and Technology, New Delhi, Department of Biotechnology and Council of Scientific and Industrial Research, New Delhi, ad well as Department of Science and Technology Govt. of Rajasthan, is gratefully acknowledged. This support was especially instrumental in assisting many students and scientists to attend the symposium.

The enthusiastic participation and the devoted and detailed attention to organizing the symposium by many faculty members, post-graduate students and post-doctoral fellows in the Department of Botany, University of Rajasthan, are gratefully acknowledged. Without their generous help the symposium would not have been a success. In the last, I would like to express my gratefulness to Dr. C. R. Bhatia, the then Secretary, Department of Biotechnology, Government of India, New Delhi, Professor P. R. Shewry, Director Long

Ashton Research Station, Bristol, U. K. and Professor S. C. Maheshwari Department of Botany and Plant Molecular Biology, University of Delhi who very kindly agreed to participate in this symposium and contributed their valuable research findings.

I also take this opportunity to express my deep sense of gratitude and profound regards to my teacher Professor Naresh Chandra whose valuable guidance imparted me the basic training of plant tissue culture in early seventies and this inspired me to organize this symposium on the occasion of his 60th birth day, and to publish the present volume.

L. K. Pareek

Contributors

1. **AGNIHOTRI, ABHA**,
Agriculture and Agri-Food
Canada Research Centre,
107 Science Place, Saskatoon,
Saskatchewan S7N 0X2,
Canada, & Biotechnology Division,
Tata Energy Research Institute,
Darbari Seth Block, Habitat Place,
Lodi Road,
New Delhi – 110003 (India)
2. **AGRAWAL, ANURADHA**
Department of Botany,
University of Delhi,
Delhi – 110002 (India)
3. **AGRAWAL, VEENA**
Department of Botany,
University of Delhi,
Delhi – 110007 (India)
4. **ANANTANANDTHIRTH, M.A.**
Divya Jyot Ayurvedic Research
Foundation,
Vehelal, Ta. Daskol,
Dist. Ahmedabad - 382 325 (India)
5. **ARORA, F.S.**
Department of Landscaping and
Floriculture, Punjab Agricultural
University,
Ludhianna - 141004, Punjab, India.
6. **ARYA, INDER DEV**
Department of Physiological Botany,
University of Uppsala, Box 540,
751,27, Uppsala, Sweden &
Tropical Forest Research Institute,
Jabalpur - 482 021. (India)
7. **ARYA, SARITA**
Department of Physiological Botany,
University of Uppsala, Box 540,
75L21,, Uppsala, Sweden & Tropical
Forest Research Institute,
Jabalpur - 482 021(India)
8. **AUGUSTIN, ALICE C.**
Laboratory of Applied Biology,
St. Aloysius College,
Manglore - 575 003 (India)
9. **BALAKRISHNAMURTHY, G.**
Tissue Culture Unit,
Department of Pomology,
Horticultural College and Research
Institute,
Tamil Nadu Agricultural University,
Coimbatore - 641 003 (India)
10. **BAPAT, V. A.**
Biotechnology Division,
Bhabha Atomic Research Centre,
Trombay
Bombay - 400 085 (India)
11. **BARCELO, P.**
ICAR-Rothamsted, Harpenden,
Herts ALS 2|Q.
12. **BARRO, F.**
ICAR-Rothamsted, Harpenden,
Herts ALS 2fQ
13. **BEHERA, PRASANTA, K.**
Plant Physiology Laboratory,
Departments of Botany,
Berhampur University,
Berhampur - 760 007 (India)
14. **BHATIA, C. R.**
Bhabha Atomic Research Centre,
Bombay-100 085 (India)
15. **BHATLA, S. C.**
Department of Botany,
University of Delhi,
Delhi - 110 007 (India)
16. **BRAGANZA, GRACE**
Dept. of Botany,
Gujarat University,
Ahmedabad – 380009 (India)
17. **CHANDRA, N.**
Department of Botany,
University of Rajasthan,
Jaipur - 302 004 (India)

18. **D'SOUZA, L.**
Laboratory of Applied Biology,
St. Aloysius College
Mangalore - 575 003 (India)
19. **D'SOUZA, L.**
Laboratory of Applied Biology,
St. Aloysius College,
Mangalore - 575 003 (India)
20. **D'SILVA, ICY**
Laboratory of Applied Biology,
St. Aloysius College,
Mangalore 575 003 (India)
Department of Botany,
University of Toronto, Toronto,
Canada
21. **DESWAL, RENU**
School of Life Sciences,
Jawaharlal Nehru University,
New Delhi - 1.10 067 (India)
22. **DOWNEY, R. K.**
Agriculture and Agri-Food
Canada Research Centre,
107 Science Place, Saskatoon,
Saskatchewan S7N OX2, Canada
23. **GANAPATHI, T. R.**
Biotechnology Division,
Bhabha Atomic Research Centre,
Trombay,
Bombay - 400 085 (India)
24. **GIII, R.I.S.**
Forestry Department,
Punjab Agricultural University,
Ludhiana - 1.41 004 (India)
25. **GILL, S. S.**
Forestry Department,
Punjab Agricultural University,
Ludhiana - 1.41 004 (India)
26. **GOSAL, S. S.**
Biotechnology Centre,
Punjab Agricultural University,
Ludhiana - 1.41, 004 (India)
27. **GREWAL, H. S.**
Executive Engineer (Hort.),
Division Punjab Agricultural
University,
Ludhiana - 141. 004 Punjab (India)
28. **GUPTA, SHRISH C.,**
Department of Botany,
University of Delhi,
Delhi - 110 007 (India)
29. **GUPTA, V. K.**
Department of Biochemistry,
Kurukshetra University,
Kurukshetra - 1,32 11.9 (India)
30. **HALFORD, N. G.**
ICAR-Long Ashton Research Station,
Department of Agricultural Sciences,
University of Bristol, Long Ashton,
Bristol BS16 1AF
31. **HEBLE, M. R.**
The Kelkar Education Trust,
Mulund East,
Bombay - 400 087 (India)
32. **HEGDE, SMITHA**
Laboratory of Applied Biology,
St. Aloysius College,
Mangalore - 575 003 (India)
33. **FAMBHULKAR, S. J.**
Bhabha Atomic Research Center,
Bombay - 400 085 (India)
34. **FOSEPH, E. F.**
Department of Agricultural
Biotechnology,
Timiriyazev's Agricultural Academy of
Moscow,
35. **TIMIRIAZEVSAYA ULITSA,**
Moscow - 727 500 (Russia)
36. **KALRA GEETIKA**
Department of Botany,
University of Delhi,
Delhi - 770 007 (India)
37. **KAPOOR, SANGEETA**
Department of Botany,
University of Delhi,
Delhi - 1.1.0 007 (India)
38. **KAUL, M. L. H.**
Botany Department,
Kurukshetra University,
Kurukshetra - 732 119 (India)
39. **KAUR, FASWINDER**
Department of Botanical Sciences
Guru Nanak Dev University,
Amritsar - 143 005 (India)
40. **KAVITHA, HEGDE**
Laboratory of Applied Biology,
St. Aloysius College,
Mangalore - 575 003 (India)
41. **KOHLI, U. K.**
Department of Vegetable Crops,
Dr. Y. S. Parmar University of
Horticulture and Forestry,
Solan - 773 230 (India)
42. **KRISHNAMURTHY, K. V.**
Plant Tissue Culture Division,
National Chemical Laboratory,
Pune - 411 008 (India)

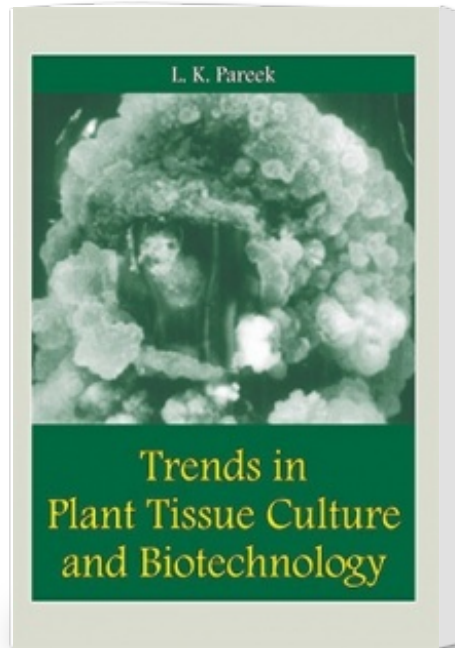
43. **KULKARNI, R.**
Laboratory of Applied Biology,
St. Aloysius College,
Mangalore - 575 003 (India)
44. **KUMAR, A. VANDANA**
G.B. Pant University of Agriculture &
Technology,
Hill Campus, Ranichauri
Distt. Tehri Garhwal - 249 7gg (India)
45. **KUMAR, ASHOK**
Department of Vegetable Crops,
Dr. Y. S. Parmar University of
Horticulture and Forestry,
Solan - 773 230 (India)
46. **KUMAR, ATUL**
G.B. Pant University of Agriculture &
Technology,
Hill Campus, Ranichauri,
Distt. Tehri Garhwal - 249 t}g (India)
47. **KUMAR, MEENA**
Botany Department,
University School of Sciences,
Gujarat University,
Ahmedabad - 380 009 (India)
48. **LAZZERI, P,**
ICAR-Rothamsted,
Harpenden, Herts AL5 2]Q, UK
49. **LIU, R. |ANG**
Genetic Engineering Research Institute,
Kist Box 17, Taejon, Korea
50. **MALIK, C. P.**
Department of Botany,
Punjab Agricultural University,
Ludhiana - 147 004 (India)
51. **MATHUR, SHASHI**
Department of Botany,
University of Rajasthan,
Jaipur - 302 004 (India)
52. **MOHAN RAM, H. Y.**
Department of Botany,
University of Delhi,
Delhi - 110002 (India)
53. **NAUTIYAL, M. C.**
G.B. Pant University of Agriculture &
Technology,
Hill Campus, Ranichauri,
Distt. Tehri Garhwal - 249 199 (India)
54. **NIGAM, NEENA**
Vincent, Grace Braganza Research
Laboratory
for Biological Sciences, LCRD,
St. Xavier's College,
Ahmedabad - 380 009 (India)
55. **NIKIFOROVA, L D.**
Department of Agricultural
Biotechnology,
Timiriazev's Agricultural Academy of
Moscow
56. **TIMIRIAZEVSKAYA ULITSA,**
Moscow - 727 500 (Russia)
57. **NIRMALA, C. N.**
Botany Department,
Kurukshetra University,
Kurukshetra - 1.32 1.L9 (India)
58. **PAREEK, L. K.**
Department of Botany,
University of Rajasthan,
Jaipur - 302 004 (India)
59. **RANI FANSI**
Tissue Culture Unit,
Department of Pomology,
Horticultural College & Research
Institute,
Tamil Nadu Agricultural University,
Coimbatore - 641 003 (India)
60. **RANI, JANSI, G. BALAKRISHNAMURTHY,**
G.
Tissue Culture Unit.,
Department of Pomology,
Horticultural College and Research
Institute,
Tamil Nadu Agricultural University,
Coimbatore - 641 003 (India)
61. **RAO, MURALIDHARA, M.**
Department of Microbiology & Cell
Biology
Indian Institute of Science,
Bangalore - 560 012 (India)
62. **RAO, P. S.**
Biotechnology Division,
Bhabha Atomic Research Centre,
Trombay,
Bombay,- 400 085 (India)
63. **ROIA, G.**
Plant Biotechnology Section,
Bhabha Atomic Research Centre,
Trombay
Bombay - 400 085 (India)
64. **ROUT, GYANARANIAN**
Regional Plant Resource Centre,
Bhubaneswar - 75'1.012 (India)
65. **ROY, SUCHISMITA**
Department of Botany,
Gauhati University
Guwahati - 781. 01.4 Assam (India)

66. **SAGARE, A. P.**
Plant Tissue Culture Division
National Chemical Laboratory,
Pune - 411 008 (India)
67. **SAMANTARAY, PUSPITA**
Plant Physiology Laboratory,
Department of Botany,
Berhampur University,
Berhampur - 760 007 (India)
68. **SARMA, C, M,**
Department of Botany,
Gauhati University,
Guwahati - 78101.4 Assam (India)
69. **SAXENA,, O, P.**
Dept. of Botany,
Gujarat University,
Ahmedabad - 380 009 (India)
70. **SAXENA, SHOBHNA,,**
Botany Department,
School of Sciences,
Gujarat University,
Ahmedabad - 380 009 (India)
71. **SEGUIN-SWARTZ, G.**
Agriculture and Agri-Food
Canada Research centre,
107 Science Place, Saskatoon,
Saskatchewan S7N 0X2, Canada
72. **SEN, SUMITRA**
Centre of Advanced Study
(Cell and Chromosome Research),
Department of Botany,
University of Calcutta,
Calcutta - 700 019 (India)
73. **SHAH, R. K.**
Divya Jyot Ayurvedic Research
Foundation,
Vehelal, Ta. Daskol, Dist.
Ahmedabad - 3BZ 325 (India)
74. **SHARMA, D. R.**
Department of Biochemistry,
Kurukshetra University,
Kurukshetra - 132 1.1.9 (India)
75. **SHARMA, GOVIND, C.**
Department of Plant & Soil Science,
Alabama A & M University,
Normal, AL 35762, USA
76. **SHARMA, PUSHP**
Department of Botany,
Punjab Agricultural University,
Ludhiana - 1.41 004 (India)
77. **SHEWRY, P. R.**
IACR-Long Ashton Research Station,
Department of Agricultural Sciences,
University of Bristol,
Long Ashton, Bristol BS19AF
78. **SINGH, BIR**
Department of Botany,
Punjab Agricultural University,
Ludhiana - 1.41. 004 (India)
79. **SITA, LAKSHMI, G.**
Department of Microbiology and Cell
Biology,
Indian Institute of Science,
Bangalore - 560 012 (India)
80. **SOPORY, K., SUDHIR**
School of Life Sciences,
Jawaharlal Nehru University,
New Delhi - 1.1.0 067 (India)
81. **SRIVASTAVA, D. K.**
Department of Biotechnology,
Dr. Parmar, Y.S. University of
Horticulture and Forestry,
Nauni-Solan - 1.73 230 (India)
82. **SUHASINI, K.**
Plant Tissue Culture Division,
National Chemical Laboratory,
Pune - 411 008 (India)
83. **SUPRASANNA, P.**
Biotechnology Division,
Bhabha Atomic Research Centre,
Trombay,
Bombay - 400 085 (India)
84. **SWARNKAR, P. L.**
Department of Botany,
University of Rajasthan,
Jaipur - 302 004 (India)
85. **TAGE, ERIKSSON**
Department of Physiological Botany,
University of Uppsala,
Box 540, 75121, Uppsala, Sweden
86. **TATHAM, A. S.**
IACR-Long Ashton Research Station,
Department of Agricultural Sciences,
University of Bristol, Long Ashton,
Bristol BS19AF
87. **TYAGI, VIBHA**
Department of Botany,
University of Rajasthan,
Jaipur - 302 004 (India)
88. **VIRK, G, S.**
Department of Botanical Sciences,
Guru Nanak Dev University,
Amritsar - 143 005 (India)

Contents

1. Recent Developments and Issues in Plant Science.....	1
<i>Govind Chandra Sharma</i>	
2. Agrobacterium- Mediated Gene Transfer in Plants- A Review	15
<i>D.K. Srivastava</i>	
3. Biotechnology: Miracle or Mirage II. Remarkable Genetic System of <i>Agrobacterium</i>	27
<i>C. Nirmala and M.L.H. Kaul</i>	
4. Synthetic Seed Technology as a Method for Plant Propagation and Delivery of Tissue Cultured Plants	43
<i>P.S. Rao, T.R. Ganapathi, P. Suprasanna and V.A. Bapat</i>	
5. Maturation and Desiccation of Somatic Embryos	49
<i>V.A. Bapat and P.S. Rao</i>	
6. Commercial Applications of Medicinal Plant Biotechnology	61
<i>M. R. Heble and G. Roja</i>	
7. Genetic Variation in <i>in vitro</i> Cultured Plant Cells and in the Progenies of Regenerated Plants	69
<i>S.J. Jambhulkar and C.R. Bhatia</i>	
8. <i>In Vitro</i> Response as Aid to Measure Genetic Diversity.....	85
<i>Sumitra Sen</i>	
9. Phytochrome, Flowering, Genes and Biotechnology	93
<i>S.C. Maheshwari</i>	
10. Tissue Culture of Aquatic Plants and Its Applications	107
<i>H.Y. Mohan Ram and Anuradha Agrawal</i>	

Trends In Plant Tissue Culture and Biotechnology



Publisher : Agrobios Publishers ISBN : 9788177540895

Author : L K Pareek

Type the URL : <http://www.kopykitab.com/product/6264>



Get this eBook

Plant tissue culture may be applied for this purpose. In vitro germplasm storage collection provides a cost effective alternative to growing plants under field conditions, nurseries or greenhouses. Furthermore, the cryopreservation of cells and tissue, revival of these tissue and regeneration of plants from tissue through tissue culture technique really effective in conservation biotechnology. Cryopreservation involves storage of cells, tissues, etc. at a very low temperature using liquid nitrogen. Related Articles: Applications of Tissue Culture: 5 Applications. Applications of Plant Tissue C... Plant genetic transformation has become an important biotechnology tool for the improvement of many crops. A solid foundation for the fast development and implementation of biotechnology in agri-culture was provided by achievements in plant tissue culture. On the 30th anniversary of plant transfor-mation, I report the advancements, recent challenges and shifts in methodology of transformation. The main focus of this paper will be on conventional and novel approaches for genetic improvements of soy-bean, cotton and corn. I will also highlight results on the transformation of these crops that ha Plant tissue culture has revolutionized the field of plant biotechnology. However, there are certain obstacles which overall restrain the output of the plant tissue culturing. One of them is contamination of the tissue culture stock which is a major problem limiting the output. Aegle marmelos (L.) is a medicinal plant whose genotype qualities are maintained through clonal propagation of nodal segment as an explant. It harbors plethora of fungi which curbs the successful in vitro propagation. Chemical fungicide like bavistin is used to prevent the contamination in tissue culture which raises th

Plant Tissue Culture: Current Status and Opportunities, Recent Advances in Plant in vitro Culture, Annarita Leva and Laura M. R. Rinaldi, IntechOpen, DOI: 10.5772/50568. Available from: <https://www.intechopen.com/books/recent-advances-in-plant-in-vitro-culture/plant-tissue-culture-current-status-and-opportunities>.

<https://www.apsnet.org/EDCENTER/K12/TEACHERSGUIDE/PLANTBIOTECHNOLOGY/Pages/Activity5.aspx>.

<https://sciencesamhita.com/what-is-plant-tissue-culture/>. Categories Agricultural Microbiology, Biotechnology Tags Plant Tissue Culture, Plant Tissue Culture Advantages, Plant Tissue Culture Applications, Plant Tissue Culture Method, Plant Tissue Culture Principle, Plant Tissue Culture Technique. The plant tissue culture (ptc) technique has grown spectacularly since the 1930s when it

was demonstrated that aseptic plant organs and explants could be subcultured (Gautheret 1983). A dramatic... Cite this chapter as: Staba E.J. (1988) Future Trends in Plant Cell Biotechnology. In: Pais M.S.S., Mavituna F., Novais J.M. (eds) Plant Cell Biotechnology. NATO ASI Series (Series H: Cell Biology), vol 18. Springer, Berlin, Heidelberg.

Summary: Applications of Plant Cell and Tissue Culture Systems. Karl-Hermann Neumann, Jafargholi Imani, Ashwani Kumar. Pages 291-293. Fermenter Phloem Phytohormon Seed biotechnology cell division gene expression gene transfer genetic engineering metabolism plant biotechnology plant breeding plant cell and tissue culture plant genetic engineering recombination. Authors and affiliations. Jafargholi Imani. Plant tissue culture may be applied for this purpose. In vitro germplasm storage collection provides a cost effective alternative to growing plants under field conditions, nurseries or greenhouses. Furthermore, the cryopreservation of cells and tissue, revival of these tissue and regeneration of plants from tissue through tissue culture technique really effective in conservation biotechnology. Cryopreservation involves storage of cells, tissues, etc. at a very low temperature using liquid nitrogen. Related Articles: Applications of Tissue Culture: 5 Applications. Applications of Plant Tissue C... Start by marking "Plant Tissue Culture And Biotechnology: Emerging Trends (Plant Sciences/Genetics)" as Want to Read: Want to Read saving; Want to Read. Currently Reading. Read. Plant Tissue Culture A by Kavi Kishor. Other editions. Want to Read saving; Error rating book. Refresh and try again. Rate this book. Clear rating. Collection of papers presented at the National Symposium on "Emerging Trends in Plant Tissue Culture and Molecular Biology" organised by Department of Genetics, Osmania University during January 1997. Get A Copy. Amazon.