



Instituto Internacional de Recursos Fitogenéticos  
Grupo para las Américas

## Bibliografía sobre Conservación *Ex Situ*

*Compilada por  
Dimary Libreros Ferla*

Cali, Colombia, julio del 2004

## CONTENIDO

### Modulo 1

Conceptualización y contextualización acerca de la conservación de recursos fitogenéticos (Germoplasma <i>ex situ</i> )	2
Política en recursos fitogenéticos	4
Referencias sobre la conservación <i>in situ</i> de los recursos fitogenéticos	5

### Modulo 2


Documentación	6
Costos operativos de un banco	7
Manual de operaciones de un banco	8





### Modulo 3

Introducción o adquisición de germoplasma (semillas, material vegetativo)	8
Incremento, multiplicación y regeneración	9
Caracterización y evaluación	10
Cosecha, acondicionamiento, cuantificación (Conservación del germoplasma)	
Conservación de la semilla	11
Conservación de polen	12
Conservación <i>in vitro</i>	12
Crioconservación	14
Conservación de AND	14
Conservación en campo	15
Viabilidad de la semilla	15
Sanidad y cuarentena vegetal	16
Conservación del germoplasma a corto/largo plazo	17
Monitoreo del germoplasma	18
Distribución del germoplasma	19

## MODULO 1

### Conceptualización y contextualización acerca de la conservación de recursos fitogenéticos (*Germoplasma ex situ*).

- Almekinders, C. y de Boef, W. (eds.) 2000. Encouraging diversity. The conservation and development of plant genetic resources. IT Publications, London, UK.
- Berthaud, J., Glaszmann, J.C., Clerget, B. y Schwendiman, J. 1997. Strategies for conservation of genetic resources in relation with their utilization. *Euphytica* 96:1-12.
- Comisión de Recursos Genéticos para la Alimentación y la Agricultura (CRGAA). 1991. Código de conducta sobre la biotecnología en relación con los recursos genéticos para la alimentación y la agricultura.  
<http://www.fao.org/ag/cgrfa/Spanish/Biocode.htm>
- Chweya, J.A. y Eyzaguirre, P.B. (eds.) 1999. The biodiversity of traditional leafy vegetables. IPGRI, Rome, Italy.
- Engelmann, F. y Engels, J.M.M. 2002. Technologies and strategies for *ex situ* conservation. Pp. 89-103 *en* Managing plant genetic diversity (Engels, J.M.M., Ramanatha Rao, V., Brown, A.H.D. y Jackson, M.T., eds.). CABI Publishing, Wallingford, UK.  
<http://www.cabi-publishing.org/Bookshop/Readingroom/0851995225.asp>
- Engels, J.M.M. 2002a. Genebank management: an essential activity to link conservation and plant breeding. *Plant Genetic Resources Newsletter* 129:17–24.  
[http://www.ipgri.cgiar.org/pgrnewsletter/article.asp?id\\_article=41&id\\_issue=129](http://www.ipgri.cgiar.org/pgrnewsletter/article.asp?id_article=41&id_issue=129)
- Engels, J.M.M. y Visser, B. 2000. Strategies and methodologies in genetic diversity conservation. *en* Encouraging diversity: Crop development and conservation in plant genetic resources (Almekinders, C. y de Boef, W., eds.). IT Publications, London, UK.
- Engels, J.M.M. y Visser, B. 2003. A guide for effective germplasm collection management. IPGRI, Rome, Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=899](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=899)  [Archivo pdf](#)
- Engels, J.M.M. 2001. Complementary strategies for improved conservation and use of plant genetic resources. Pp. 69–77 *en* Towards sustainable national plant genetic resources programmes—policy, planning and coordination issues. (Engels, J.M.M., Vodouhe, R., Thompson, J., Zannou, A., Hehne, E. y Grum, M., eds.). Proceedings of an International Workshop, 10–18 May 2000, Zschortau – Germany. IPGRI, Nairobi, Kenya.
- Engle, L.M. 1992. Introduction to concepts of germplasm conservation. Pp. 11-17 *en* Germplasm collection, evaluation, documentation and conservation (Chadna, M.L., Anzad Hossain, A.M.K. y Monowar Hossain, S.M., comp.). Memorias del curso realizado en Bangladesh por el Asian Vegetable Research and Development Center, el Bangladesh Agricultural Research Council y el Bangladesh Agricultural Research Institute, mayo 4-6 de 1992. Asian Vegetable Research and Development Center, Taiwan.
- FAO. 1998. The state of the world's plant genetic resources for food and agriculture. FAO, Rome, Italy. [http://www.fao.org/WAICENT/Faoinfo/Agricult/AGP/AGPS/pgrfa/pdf/swrshr\\_s.pdf](http://www.fao.org/WAICENT/Faoinfo/Agricult/AGP/AGPS/pgrfa/pdf/swrshr_s.pdf)
- Greene, S.L. y Morris, J.B. 2001. The case for multiple-use plant germplasm collections and a strategy for implementation. *Crop Science* 41:886–892.

- Hijmans, R.J., Garrett, K.A., Huamán, Z., Zhang, D.P., Schreuder, M. y Bonierbale, M. 2000. Assessing the geographic representativeness of genebank collections: the case of Bolivian wild potatoes. *Conservation Biology* 14:1755–1765.
- Jaramillo, S. y Baena, M. 2000. Material de apoyo a la capacitación en conservación *ex situ* de recursos fitogenéticos. Instituto Internacional de Recursos Fitogenéticos, Cali, Colombia. <http://www.ipgri.cgiar.org/training/exsitu/exsitu.htm>  [Archivo pdf](#)
- Karp, A., Kresovich, S., Bhat, K.V., Ayad, W.G. y Hodgkin, T. 1997. Molecular tools in plant genetic resources conservation: a guide to the technologies. IPGRI. Technical Bulletin No. 2. IPGRI, Rome, Italy. [http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=138](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=138)  [Archivo pdf](#)
- Karp, A. 2001. The new genetic era: will it help us in managing genetic diversity? Pp. 43–56 *en* *Managing plant genetic diversity* (Engels, J.M.M., Ramanatha Rao, V., Brown, A.H.D. y Jackson, M.T., eds.). CABI Publishing, Wallingford, Oxon, UK.
- Rao, V.R. y Engels, J.M.M. (eds.) 1998. Regeneration of seed crops and their wild relatives. Proceedings of a consultation meeting, 4–7 December 1995, ICRISAT, Hyderabad, India. IPGRI, Rome, Italy. [http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=1](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=1)  [Archivo pdf](#)
- Pistorius, R. 1997. Scientists, plants and politics. A history of the plant genetic resources movement. IPGRI, Rome, Italy.. [http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=240](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=240)
- Sackville Hamilton, N.R., Engels, J.M.M., van Hintum, T., Koo, B. y Smale, M. 2002. Accession management. combining or splitting accessions as a tool to improve germplasm management efficiency. IPGRI Technical Bulletin No. 5. IPGRI, Rome, Italy. [http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=800](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=800)  [Archivo pdf](#)
- SGRP. 1996. Report of the internally commissioned external review of the CGIAR genebank operations. IPGRI, Rome, Italy. <http://www.sgrp.cgiar.org/>
- SGRP. 1997. Report of the internally commissioned external review of the CGIAR Genebank operations. Annex: Centres' responses to the external review. IPGRI, Rome, Italy. System wide Genetic Resources Programme <http://www.sgrp.cgiar.org/>
- Sobral, B.W.S. 2001. The role of bioinformatics in germplasm conservation and use. Pp. 171–178 *en* *Managing plant genetic diversity* (Engels, J.M.M., Ramanatha Rao, V., Brown, A.H.D. y Jackson, M.T., eds.). CABI Publishing, Wallingford, UK.
- UNEP. 1992. Convention on biological diversity. UNEP, Nairobi, Kenya. <http://www.biodiv.org/doc/info-centre.asp?lg=1&menu=home&tab=1>
- Visser, B. y Nap, J.P. 2002. Biotechnology and agrobiodiversity, in biological and medical sciences in *Encyclopedia of Life Support Systems (EOLSS)*, Eolss Publishers, Oxford, UK <http://www.eolss.net>
- Weitzman, M. 1993. What to preserve: an application of diversity theory to crane conservation. *Quarterly Journal of Economics* 108:144–152.


Withers, L.A. 1994. Constraints and prospects of complementary conservation methods and strategies for cassava germplasm. Pp. 135-140 *en* Report of the first meeting of the international network for cassava genetic resources, CIAT, Cali, Colombia, 18–23 August 1992. International Crop Network Series No. 10. IPGRI, Rome, Italy.

## Política en recursos fitogenéticos

IPGRI. 1999. Key questions for decision makers. Protection of plant varieties under the WTO Agreement on Trade- Related Aspects of Intellectual Property Rights. Decision Tools, October 1999. International Plant Genetic Resources Institute, Rome, Italy.

[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=41](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=41)  Archivo pdf

Cooper, H.D. 2002. The international treaty on plant genetic resources for food and agriculture. RECIEL 11(1):1–16.

Cooper, H.D., Engels, J.M.M. y Frison, E. 1994. A multilateral system for plant genetic resources: imperatives, achievements and challenges. Issues in Genetic Resources No. 2. IPGRI, Rome, Italy. [http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=464](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=464)  Archivo pdf

Crucible II Group. 2000. Siembra de soluciones. Volume 1. Alternativas políticas en material de recursos genéticos (Actualización de gentes, plantas y patentes). Centro Internacional de Investigación para el desarrollo (CIID), Ottawa, Canada, Instituto Internacional de Recursos Fitogenéticos (IPGRI), Roma, Italia y la Fundación Dag Hammarskjöld, Uppsala, Suecia.

[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=577](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=577)  Archivo pdf

Crucible II Group. 2001. Seeding solutions. Volume 2. Options for national laws governing control over genetic resources and biological innovations. IDRC, Ottawa, Canada, IPGRI, Rome, Italy and Dag Hammarskjöld Foundation, Uppsala, Sweden.

[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=689](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=689)  Archivo pdf

Frisvold, G.B. y Condon, P.T. 1998. The convention on biological diversity and agriculture: Implications and unresolved debates. World Development 26:551–570.

<http://ideas.repec.org/a/eee/wdevel/v26y1998i4p551-570.html>

Petit, M., Fowler, C., Collins, W., Correa, C. y Thornstrom, C.G. 2001. Why governments can't make policy. The case of plant genetic resources in the international arena. CIP, Lima, Peru.

Leskien, D. y Flitner, M. 1997. Intellectual property rights and plant genetic resources: Options for a sui generis system. Issues in Genetic Resources No. 6. IPGRI, Rome, Italy.

[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=29](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=29)  Archivo pdf

Libreros, D. (comp). 2002. Bibliography on access to plant genetic resources and intellectual property rights. International Plant Genetic Resources Institute, Cali, Colombia.

[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=897](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=897)  Archivo pdf

Louwaars, N.P. 1998. Sui generis rights: from opposing to complementary approaches. Biotechnology and Development Monitor 36:13–16.

<http://www.biotech-monitor.nl/3607.htm>

Raymond, R. y Fowler, C. 2001. Sharing the non-monetary benefits of agricultural biodiversity. Issues in Genetic Resources No. 5. IPGRI, Rome, Italy.

[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=683](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=683)  Archivo pdf

Spillane, C., Engels, J., Fassil, H., Withers, L. y Cooper, D. 1999. Strengthening national programmes for plant genetic resources for food and agriculture. Issues in Genetic Resources No. 8. IPGRI, Rome, Italy.

[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=29](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=29)  [Archivo pdf](#)

UPOV. 1991. International Convention for the Protection of New Varieties of Plants. UPOV, Geneva, Switzerland. <http://www.upov.int/>

WTO. 1994. Agreement on trade-related aspects of intellectual property rights (TRIPS-agreement). WTO, Geneva, Switzerland.

## Referencias sobre la conservación *in situ* de los recursos fitogenéticos

Altieri, M.A. y Merrick, L.C. 1987. *In situ* conservation of crop genetic resources through maintenance of traditional farming systems. *Economic Botany* 41:86–96.

Baena, M., Jaramillo, S. y Montoya, J.E. 2003. Material de apoyo a la capacitación en conservación *in situ* de la diversidad vegetal en áreas protegidas y en fincas. Instituto Internacional de Recursos Fitogenéticos, Cali, Colombia.

[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=905](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=905)  [Archivo pdf](#)

Boukema, I.W., van Hintum, T.J.L. y Thomas, G. 1998. The European *Brassica* database. *Brassica '97*. Proceedings of the international symposium on brassicas, Rennes, France, 23–27 September 1997. *Acta Horticulturae* 459:249–254.

BRG. 1999. Charte Nationale pour la gestion des ressources génétiques. Bureau des Ressources Génétiques (BRG), Paris, France.

Brush, S.B. 1986. Genetic diversity and conservation in traditional farming systems. *Journal of Ethnobiology* 6:151–167.

Brush, S.B. (ed.) 1999. *Genes in the Field*. On-farm conservation of crop diversity. Lewis Publishers, Boca Raton, Florida, USA, IPGRI, Rome, Italy, and IDRC, Ottawa, Canada.

Damania, A.B. 1996. Biodiversity conservation: a review of options complementary to standard *ex situ* methods. *Plant Genetic Resources Newsletter* 107:1–18.

Engels, J.M.M. (ed.) 1995. *In situ* conservation and sustainable use of plant genetic resources for food and agriculture in developing countries. Report of a DSE/ATSAF/IPGRI Workshop, 2–4 May 1995, Bonn-Röttgen, Germany. IPGRI, Rome, Italy and DSE, Feldafing, Germany.

Engels, J.M.M. 2002b. Home gardens—a genetic resources perspective. Pp. 3-9 *en* Home gardens and *in situ* conservation of plant genetic resources in farming systems. (Watson, J.W. y Eyzaguirre, P.B., eds.). Proceedings of the Second International Home Gardens Workshop 17–19 July 2001, Witzenhausen, Germany IPGRI, Rome, Italy.

[http://www.ipgri.cgiar.org/publications/pubfile+.asp?ID\\_PUB=753](http://www.ipgri.cgiar.org/publications/pubfile+.asp?ID_PUB=753)  [Archivo pdf](#)


Engels, J., Thormann, I. y Metz, T. 2001. A species compendium for plant genetic resources conservation. *En* Rudolf Mansfeld and Plant Genetic Resources. (Knueppfer, H. y Ochsmann, J. eds.) Proceedings of a symposium dedicated to the 100th birthday of Rudolf Mansfeld, Gatersleben, Germany, 8–9 October 2001. *Schriften zu Genetischen Ressourcen* vol. 18. ZADI/IBV, Bonn, Germany.

- Engels, J.M.M., Vodouhe, R., Thompson, J., Zannou, A., Hehne, E. y Grum, M. (eds.) 2001. Towards sustainable national plant genetic resources programmes—Policy, Planning and Coordination Issues. Proceedings of an International Workshop, 10–18 May 2000, Zschortau – Germany. IPGRI, Nairobi, Kenya.
- Ingram, G.B. 1984. *In situ* conservation of the genetic resources of plants: The scientific and technical base. Forest Resources Division, FAO, Rome, Italy.
- Jarvis, D. y Hodgkin, T. 2000a. Farmer decision making and genetic diversity: linking multidisciplinary research to implementation on-farm. Pp. 261–278 *en* Genes in the Field. Onfarm conservation of crop diversity (Brush, S.B., ed.). Lewis Publishers, Boca Raton, Florida, USA, IPGRI, Rome, Italy, and IDRC, Ottawa, Canada.
- Jarvis, D.I., Myer, L., Klemick, H., Guarino, L., Smale, M., Brown, A.H.D., Sadiki, M., Sthapit, B. y Hodgkin, T. 2000b. A training guide for *in situ* conservation on-farm. Version 1. IPGRI, Rome, Italy.
- Krutilla, J.V. 1967. Conservation reconsidered. *American Economic Review* 57(3):777–786.
- Maxted, N., Hawkes, J.G., Ford-Lloyd, B.V. y Williams, J.T. 1997b. A practical model for *in situ* genetic conservation. Pp. 339–363 *en* Plant genetic conservation: the *in situ* approach (Maxted, N., Ford-Lloyd, B.V. y Hawkes, J.G., eds.). Chapman and Hall, London, UK.
- Nissilä, E.A.J., Rao, V.R., Engelmann, F. y Riley, K.W. 1999. *Ex situ* strategies for complementary conservation of Asian sweet potatoes. *Plant Genetic Resources Newsletter* 117:1–11.
- Oldfield, M.L. y Alcorn, J.B. 1987. Conservation of traditional agroecosystems: can age-old farming practices conserve crop genetic resources? *BioScience* 37:199–208.
- Polasky, S. y Solow, A. 1995. On the value of a collection of species. *Journal of Environmental Economics and Management* 29(3):298–303.
- Prescott-Allen, R. 1984. *In-situ* conservation of wild plant genetic resources: a status review and action plan. Background document for the First Session of the FAO Commission on Plant Genetic Resources. CPGRFA, FAO, Rome.
- Prescott-Allen, R. y Prescott-Allen, C. 1984. Park your genes: protected areas as *in situ* genebanks for the maintenance of wild genetic resources. Pp. 634–638 *en* National Parks, Conservation and Development: the role of protected areas in sustaining society (McNeely, J.A. y Miller, K.R., eds.). Smithsonian Institution Press, Washington, DC, USA.

## MODULO 2

### Documentación

- Chang, T.T. 1985. Evaluation and documentation of crop germplasm. *Iowa State Journal of Research* Vol. 59(4):379-397, 457-496.
- CGIAR. The System-wide Information Network for Genetic Resources (SINGER). <http://www.singer.cgiar.org>
- CGIAR. 1997. The CGIAR system-wide genetic resources programme. <http://www.sgrp.cgiar.org>

- FAO/IPGRI. 1994. Genebank standards. FAO, IPGRI, Rome, Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=424](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=424)  Archivo pdf
- Franco, T. y Hidalgo, R. (eds.). 2003. Análisis estadístico de datos de caracterización morfológica de recursos fitogenéticos. Boletín técnico No.8. Instituto Internacional de Recursos Fitogenéticos (IPGRI), Cali, Colombia.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=894](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=894)  Archivo pdf
- Huamán, Z., Hoekstra, R. y Bamberg, J.B. 2000. The Intergenebank potato database and the dimensions of available wild potato germplasm. American Journal of Potato Research 77:353–362.
- IPGRI. Base de datos sobre bancos de germoplasma.  
<http://www.ipgri.cgiar.org/germplasm/dbintro.htm>
- Knudsen, H. 2000. Directorio de colecciones de germoplasma en América Latina y el Caribe. Primera edición. International Plant Genetic Resources Institute (IPGRI), Roma, Italia.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=606](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=606)  Archivo pdf
- Painting, K.A., Perry, M.C., Denning, R.A. y Ayad, W.G. 1993. Guía para la documentación en recursos fitogenéticos. Un enfoque autodidáctico para la comprensión, análisis y desarrollo de la documentación de los recursos fitogenéticos. Rome Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?id\\_pub=507](http://www.ipgri.cgiar.org/publications/pubfile.asp?id_pub=507)  Archivo pdf
- Puzone, L. y Hazekamp T. (comp.). 1998. Characterization and documentation of genetic resources utilizing multimedia databases. Memorias del taller realizado en Nápoles por el International Plant Genetic Resources Institute, diciembre 19-20 de 1996. International Plant Genetic Resources Institute, Italia.
- van Hintum, Th.J.L. y Hazekamp, T. (eds.) 1993. CGN Genebank Protocol. Centre for Plant Breeding and Reproduction Research (CPRO-DLO), Centre for Genetic Resources, The Netherlands (CGN), Wageningen, The Netherlands.
- Zohrabian, A. 2000. An economic model of utilization of U.S. crop germplasm collection: The case of soybean collection and soybean cyst nematode. PhD thesis, Auburn University, USA.

## **Costos operativos de un banco**

- Clark, R.L., Shands, H.L., Bretting, P.K. y Eberhart, S.A. 1997. Managing large diverse germplasm collections. Crop Science 37:1–6.
- Burstin, J., Lefort, M., Mitteau, M., Sontot, A. y Guiard, J. 1997. Towards the assessment of the cost of genebanks management: conservation, regeneration and characterization. Plant Varieties and Seeds 10:16–172.
- Epperson J.E., Pachico D. and Guevara, C.L. 1997. A cost analysis of maintaining cassava plant genetic resources. Crop Science 37:1641–1649.
- Pardey, P.G., Koo, B., Wright, B.D., van Dusen, M.E., Skovmand, B. y Taba, S. 2001. Costing the ex situ conservation of genetic resources: maize and wheat at CIMMYT. Crop Science 41(4):1286–1299.

## Manual de operaciones de un banco

IRRI. 1995. Manual of operations and procedures of the International Rice Genebank. IRRI, Los Baños, Philippines.

[http://www.knowledgebank.irri.org/grcOpsManual/GRC\\_opsManual.htm#Welcome.htm](http://www.knowledgebank.irri.org/grcOpsManual/GRC_opsManual.htm#Welcome.htm)

Rao, N.K. y Bramel, P.J. 2000. Manual of genebank operations and procedures. Technical Manual No. 6. ICRISAT, Patancheru, India.

## MODULO 3

### Introducción o adquisición de germoplasma (semillas, material vegetativo)

Adams, R.P. 1997. Conservation of DNA: DNA banking. Pp. 163–174 *en* Biotechnology and plant genetic resources conservation and use (Callow, J.A., Ford-Lloyd, B.V. y Newbury, H.J., eds.). CAB International, Wallingford, UK.

Allard, R.W. 1970. Population structure and sampling methods. Pp. 97–107 *en* Genetic resources in plants—Their exploration and conservation (Frankel, O.H. y Bennett, E., eds.). IBP Handbook No. 11. Blackwell Scientific, Oxford, UK.

Altman, D.W., Fryxell, P.A., Koch, S.D. y Howell, C.R. 1990. *Gossypium* germplasm conservation augmented by tissue culture techniques for field collecting. *Economic Botany* 44:106–113.

Assy Bah, B., Durand-Gasselin, T., Engelmann, F. y Pannetier, C. 1989. Culture *in vitro* d'embryons zygotiques de cocotier (*Cocos nucifera* L.). Méthode, révisée et simplifiée, d'obtention de plants de cocotiers transférables au champ. *Oléagineux* 44:515–523.

Barton, J.H. y Siebeck, W.E. 1994. Material transfer agreements in genetic resources exchange: The case of the International Agricultural Research Centres. *Issues in Genetic Resources* N° 1. International Plant Genetic Resources Institute, Italia.



[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=109](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=109)  [Archivo.pdf](#)

Brown, A.H.D. y Marshall, D.R. 1995. A basic sampling strategy: theory and practice. Pp. 75–91 *en* Collecting plant genetic diversity. Technical guidelines (Guarino L., Rao, V.R. y Reid, R., eds.). CAB International, Wallingford, UK.

Christinck, A., vom Brocke, K., Kshirsagar, K.G., Weltzien, E. y Bramel-Cox, P.J. 2000. Participatory methods for collecting germplasm: Experiences with farmers in Rajasthan, India. *Plant Genetic Resources Newsletter* 121:1–9.


Engelmann, F. 1997. *In vitro* conservation methods. Pp. 119–162 *en* Biotechnology and plant genetic resources: Conservation and use (Ford-Lloyd, B.V., Newbury, J.H. y Callow, J.A., eds.). CAB International, Wallingford, UK.

Engels, J.M.M., Arora, R.K. y Guarino, L. 1995. An introduction to plant germplasm exploration and collecting: Planning, methods and procedure, follow-up. Pp. 31-63. *en* Collecting plant genetic diversity: Technical guidelines (Guarino, L., Rao, V.R. y Reid, R. eds.). CAB International, Reino Unido.

- FAO. 1994. Código internacional de conducta para la recolección y transferencia de germoplasma vegetal. Organización de las Naciones Unidas para la Agricultura y la Alimentación, Italia.  
<http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPS/PGR/icc/icc.htm>
- FAO. 1997. Convención Internacional de Protección Fitosanitaria (CIPF). Roma, Italia.  
<http://www.ippc.int/IPP/Es/default.htm>
- Ferguson, M.E., Ford-Lloyd, B.V., Robertson, L.D., Maxted, N. y Newbury, H.J. 1998. Mapping the geographical distribution of genetic variation in the genus *Lens* for the enhanced conservation of plant genetic diversity. *Molecular Ecology* 7:1743–1755.
- Guarino, L., Rao, V.R. y Reid, R. (eds.) 1995. Collecting plant genetic diversity: Technical guidelines. CAB International, Wallingford, UK.
- Hepper, F.N. 1989. Plant Hunting for Kew. HMSO, London, UK.
- IPGRI. 1996. Planning collecting missions. International Plant Genetic Resources Institute, Italia 31p. Materiales de capacitación.  
<http://www.ipgri.cgiar.org/training/unit8-1-1/unit8-1-1.htm>  [Archivo pdf](#)  [Archivo pdf](#)
- Marshall, D.R. y Brown, A.H.D. 1975. Optimum sampling strategies in genetic conservation. Pp. 53–80 *en* Crop genetic resources for today and tomorrow (Frankel, O.H. y Hawkes, J.G., eds.). Cambridge University Press, Cambridge, UK.
- Maxted, N., Ford-Lloyd, B.V. y Hawkes, J.G. (eds.). 1997. Plant genetic conservation: The *in situ* approach. Chapman and Hall, Reino Unido.
- Schoen, D.J. and Brown, A.H.D. 1991. Intraspecific variation in population gene diversity and effective population size correlates with the mating system in plants. *Proceedings of the National Academy of Sciences* 88:4494–4497.
- van Treuren, R. 2001. Efficiency of reduced primer selectivity and bulked DNA analysis for the rapid detection of AFLP polymorphisms in a range of crop species. *Euphytica* 117:27–37.
- Withers, L.A. 1995. Collecting *in vitro* for genetic resources conservation. Pp. 511–525 *en* Collecting plant genetic diversity. Technical guidelines (Guarino, L., Rao, V.R. y Reid, R., eds.). CAB International, Wallingford, UK.
- Yidana, J.A. 1988. The development of *in vitro* collecting and isozyme characterization of cocoa germplasm. PhD thesis, University of Nottingham, UK.

## **Incremento, multiplicación y regeneración**

- Brown, A.H.D., Brubaker, C.L. y Grace, J.P. 1997. Regeneration of germplasm samples: wild versus cultivated plant species. *Crop Science* 37:7–13.
- Breese, E.L. 1989. Regeneration and multiplication of germplasm resources in seed genebanks: The scientific background. IBPGR, Rome, Italy.
- Kresovich, S., McFerson, J.R. y Westman, A.L. 1997. Using molecular markers in genebanks: identity, duplication, contamination and regeneration. Pp. 23-38 *en* Molecular genetic techniques for plant genetic resources. Report of an IPGRI workshop held in Rome, Italy, 9-11 October 1995. International Plant Genetic Resources Institute, Rome, Italy.

- Sackville Hamilton, N.R. y Chorlton, K.H. 1997. Regeneration of accessions in seed collections: a decision guide. Handbooks for Genebanks No. 5. IPGRI, Rome, Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=210](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=210)
- Sackville Hamilton, N.R., Engels, J.M.M., van Hintum, T., Koo, B. y Smale, M. 2002. Accession management. combining or splitting accessions as a tool to improve germplasm management efficiency. IPGRI Technical Bulletin No. 5. IPGRI, Rome, Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=800](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=800)  Archivo pdf
- Widrechner, M.P. 1997. Managerial tools for seed regeneration. Plant Varieties & Seeds, Vol. 10(3):185-193

## Caracterización y evaluación

- Bretting, P.K. y Widrechner, M.P. 1995. Genetic markers and plant genetic resource management. Plant Breeding Review 13:11–86.
- Cooper, H.D., Spillane, C. y Hodgkin, T. 2000. Broadening the genetic base of crop production. CABI, allingford, Oxon, UK, FAO, Rome, Italy and IPGRI, Rome, Italy.
- Cuevas, A.J. 1988. Recursos fitogenéticos: Bases conceptuales para su estudio y conservación. Universidad Autónoma de Chapingo, México.
- Bretting, P.K. y Widrechner, M.P. 1995. Genetic markers and horticultural germplasm management. HortScience 30:1349–1356.
- Edwards, M. 1992. Use of molecular markers in the evaluation and introgression of genetic diversity for quantitative traits. Field Crops Research Vol. 29(1):241-260.
- Fideghelli, C., Vitellozzi, F., Grassi, F. y Sartori, A. 2003. Characterization and evaluation of fruit germplasm for a sustainable use. Acta Horticulturae, No. 598:153-160
- Hintum, T.J.L. van. 2001. The role of biometrical genetics in the study, management, and exploitation of genetic resources. Pp. 233-242 *en* Quantitative genetics and breeding methods: the way ahead. Proceedings of the Eleventh Meeting of the EUCARPIA Section biometrics in plant breeding. 30/31 August- 1 September, 2000. Institut National de la Recherche Agronomique, Paris, France
- IPGRI. Listas de descriptores <http://www.ipgri.cgiar.org/publications/descriptor.htm>
- Knüpfper, H. 2001. Handling of characterization and evaluation data in crop databases. Pp. 58-65 *en* Report of a Network Coordinating Group on Cereals. Proceedings of an ad hoc meeting, 7-8 July 2000. Radzików, Poland. International Plant Genetic Resources Institute (IPGRI), Rome, Italy.
- Stalker, H.T. y Chapman, C. 1989. Scientific management of germplasm: characterization, evaluation and enhancement. International Board for Plant Genetic Resources (IBPGR), Rome, Italy.
- Stanwood, P.C. y Wheeler, L. 1998. Evaluation of plant germplasm using digital image analysis and cryopreservation of plant genetic resources. Pp. 6-9 *en* Characterization and documentation of genetic resources utilizing multimedia databases. Proceedings of a

Workshop University of Naples Federico II, Naples, Italy, 19-20 December 1996. International Plant Genetic Resources Institute (IPGRI), Rome, Italy.

Swiecicki, W., Naganowska, B. y Wolko, B. 2002. Broad variation and precise characterization - limitation for the future. Proceedings of the XVIth EUCARPIA Genetic Resources Section workshop, Poznan, Poland, 16-20 May 2001. Workshop, Poznan, Poland. European Association for Research on Plant Breeding (EUCARPIA), Wageningen, Netherlands

## **Cosecha, acondicionamiento, cuantificación (Conservación del germoplasma)**

### **Conservación de la semilla**

Cromarty, A.S., Ellis, R.H. y Roberts, E.H. 1985. The design of seed storage facilities for genetic conservation. Handbook for Genebanks N° 1. International Board for Plant Genetic Resources, Italia.

Cromarty, A.S., Ellis, R.H. y Roberts, E.H. 1990. Design of seed storage facilities for genetic conservation (3rd ed.). IPGRI, Rome, Italy.

Chin, H.F. 1991. Conservation of recalcitrant seeds. Pp. 19-27 *en* Conservation of plant genetic resources through *in vitro* methods. Proceedings of the MNCPGR/CSC international workshop on tissue culture for the conservation of biodiversity and plant genetic resources held in Kuala Lumpur, Malaysia, 28-31 May 1990. Forest Research Institute Malaysia and Malaysian National Committee on Plant Genetic Resources, Kuala Lumpur, Malaysia

Ellis, R.H., Hong, T.D. y Roberts, E.H. 1985. Seed technology for genebanks. Handbook for Genebanks N°2, Vol. 1. International Board for Plant Genetic Resources Institute, Italia. 210p.


Engels, J.M.M. 2001. Complementary strategies for improved conservation and use of plant genetic resources. Pp. 69-77 *en* Towards sustainable national plant genetic resources programmes—policy, planning and coordination issues. Proceedings of an International Workshop, 10-18 May 2000, Zschortau – Germany (Engels, J.M.M., Vodouhe, R., Thompson, J., Zannou, A., Hehne, E. y Grum, M., eds). IPGRI, Nairobi, Kenya.

Engle, L.M. 1992. Introduction to concepts of germplasm conservation. Pp. 11-17 *en* Germplasm collection, evaluation, documentation and conservation (Chadna, M.L., Anzad Hossain, A.M.K. y Monowar Hossain, S.M., comp.). Memorias del curso realizado en Bangladesh por el Asian Vegetable Research and Development Center, el Bangladesh Agricultural Research Council y el Bangladesh Agricultural Research Institute, mayo 4-6 de 1992. Asian Vegetable Research and Development Center, Taiwan.

Grabe, D.F. 1989. Measurement of seed moisture. Pp. 69-92 *en* Seed moisture (Stanwood, P.C. y Miller, M.B., eds.). Special Publication N° 14. Memorias del simposio realizado en Atlanta por la Crop Science Society of America, noviembre 30 de 1987. Crop Science Society of America, Estados Unidos.

GuangHua, Z., XinMing, J. y KarLing, T. 1998. Ultradry seed storage cuts cost of gene bank. Nature Vol. 393(6682):223-224

Hanson, J. 1985. Procedures for handling seeds in genebanks. Practical manuals for genebanks No. 1. IPGRI, Rome, Italy.


- Harrington, J.F. 1970. Seed and pollen storage for conservation of plant gene resources. Pp. 501–521 *en* Genetic resources in plants—their exploration and conservation (Frankel, O.H. and Bennett, E., eds.). IBP Handbook No. 11. Blackwell Scientific, Oxford, UK.
- Hong, T.D. y Ellis, R.H. 1996. A protocol to determine seed storage behaviour. IPGRI Technical Bulletin No. 1. IPGRI, Rome, Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=137](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=137)  Archivo.pdf
- Hong, T.D., Linington, S. y Ellis, R.H. 1996. Seed storage behavior: A compendium. Handbook for genebanks N° 4. International Plant Genetic Resources Institute, Italia.  
[http://www.ipgri.cgiar.org/themes/exsitu/seed\\_compendium.htm](http://www.ipgri.cgiar.org/themes/exsitu/seed_compendium.htm)
- Iriondo Alegría, J.M. 2001. Germplasm conservation of rare and threatened plant species. Investigación Agraria, Producción y Protección Vegetales Vol. 16(1):5-24
- Rao, N.K. y Jackson, M.T. 1996. Seed production environment and storage longevity of japonica rices (*Oryza sativa* L.). Seed Science Research 6:17–21.
- Roos, E.E. 1989. Long-term seed storage. Plant Breeding Reviews. Vol. 7:129-158
- Towil, L.E. y Roos, E.E. 1989. Techniques for preserving of plant germplasm. Pp. 379-403 *en* Biotic diversity and germplasm preservation, global imperatives (Knutson, L. y Stoner, A.K., eds.). Kluwer Academic Publishers, Holanda.
- Walters, C. y Engels, J. 1998. The effects of storing seeds under extremely dry conditions. Seed Science Research Vol 8 (Supl.):3-8.
- Withers, L. A. 1993. New technologies for the conservation of plant genetic resources. Pp. 429-435 *en* International crop science I. International Crop Science Congress, Ames, Iowa, USA, 14-22 July 1992. Crop Science Society of America, Madison, WI, USA.

## **Conservación de polen**

- Towill, L.E. 1985. Low temperature and freeze-vacuum-drying preservation of pollen. Pp. 171–198 *en* Cryopreservation of plant cells and organs (Kantha, K.K., ed.). CRC Press, Boca Raton, Florida, USA.
- Harrington, J.F. 1970. Seed and pollen storage for conservation of plant gene resources. Pp. 501–521 *en* Genetic Resources in Plants—Their Exploration and Conservation (Frankel, O.H. y Bennett, E., eds.). IBP Handbook No. 11. Blackwell Scientific, Oxford, UK.
- Hoekstra, F.A. 1995. Collecting pollen for genetic resources conservation. Pp. 527–550 *en* Collecting plant genetic diversity: Technical guidelines (Guarino, L., Rao, V.R. y Reid, R., eds.). CAB International, Wallingford, UK.

## **Conservación *in vitro***

- Ashmore, S. 1997. Status report on the development and application of *in vitro* techniques for the conservation of plant genetic resources. IPGRI, Rome, Italy.

- Chandel, K.P.S. 1996. Use of tissue culture technology in exchange, conservation and utilization of plant genetic resources. Pp. 111-115 *en* Proceedings of the South Asia National Coordinators Meeting on Plant Genetic Resources, Dhaka, Bangladesh, 10-12 January 1995.
- Engelmann, F. 1997. *In vitro* conservation methods. Pp. 119–162 *en* Biotechnology and plant genetic resources: Conservation and use (Ford-Lloyd, B.V, Newbury, J.H. y Callow, J.A., eds.). CAB International, Wallingford, UK.
- Engelmann, F. 1998. *In vitro* germplasm conservation. Acta Horticulturae No. 461:41-47.
- Engelmann F. 1999. Management of field and *in vitro* germplasm collections. Proceedings of a Consultation Meeting, 15–20 January 1996, CIAT, Cali, Colombia. IPGRI, Rome, Italy.
- George, E.F. y Sherrington, P.D. 1996. Plant propagation by tissue culture: Handbook and directory of commercial laboratories. Parte 1. The technology. Exegetics Ltd, Edington, England.
- George, E.F. 1996. Plant propagation by tissue culture: In practice. Parte 2. Exegetics Ltd, Edington, England.
- IPGRI/CIAT. 1994. Establishment and operation of a pilot *in vitro* active genebank. Report of a CIAT-IBPGR collaborative project using cassava (*Manihot esculenta* Crantz) as a model. IPGRI, Rome, Italy and CIAT, Cali, Colombia.
- Janick, L.V., Kim, Y.H., Kitto, S. y Saranga, Y. 1993. Desiccated synthetic seed. Pp. 11–33 *en* Synseeds, Applications of synthetic seeds to crop improvement (Redenbaugh, K., ed.). CRC Press, Boca Raton, Florida, USA.
- Muruges, M., Parthiban, K.T., Surendran, C. y Buvaneswaran, C. 1999. Tissue culture - a tool for the conservation of endangered tree species. Advances in Horticulture and Forestry Vol. 6:187-191.
- Pence, V.C., Sandoval, J.A., Villalobos A., V.M. y Engelmann, F. (eds.). 2002. *In vitro* collecting techniques for germplasm conservation. IPGRI Technical Bulletin No. 7. International Plant Genetic Resources Institute, Rome, Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=866](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=866)  [Archivo pdf](#)
- Razdan, M. K. y, Cocking, E. C. 1997. Conservation of plant genetic resources *in vitro*. Volume 1: General aspects. Science Publishers, Inc. Enfield, NH, USA.
- Roca, W.M. y Mroginski, L.A. 1991. Cultivo de tejidos en la agricultura. Centro Internacional de Agricultura Tropical, Cali, Colombia.  
[http://www.ciat.cgiar.org/biotechnology/cultivo\\_tejidos/contenido.pdf](http://www.ciat.cgiar.org/biotechnology/cultivo_tejidos/contenido.pdf)
- Stacey, G.N., Lynch, P.T. y Benson, E.E. 1999. Plant gene banking: agriculture, biotechnology and conservation. Agro Food Industry Hi-Tech Vol. 10(2):9-14
- Withers, L.A. 1993. Conservation methodologies - with particular reference to *in vitro* conservation. Pp. 102-109 *en* Proceedings of the Asian Sweet Potato Germplasm Network Meeting, Guangzhou, China, 25 February-2 March 1991. International Potato Center, Manila, Philippines.

Withers LA. 1995. Collecting *in vitro* for genetic resources conservation. Pp. 511–515 *en* Collecting plant genetic diversity. Technical Guidelines (Guarino L., Rao, V.R. y Reid R., eds.) IPGRI/FAO/UNEP/IUCN and CAB International, Wallingford, UK.

## Crioconservación

Ashmore, S.E. 1997. Status report on the development and application of *in vitro* techniques for the conservation and use of plant genetic resources. International Plant Genetic Resources Institute, Italia.

Bajaj, Y.P.S. 1979. Technology and prospects of cryopreservation of germplasm. *Euphytica* Vol. 28(2):267-285.

Bajaj, Y.P.S. 1983. Cryopreservation and international exchange of germplasm. Pp. 19-41 *en* Plant cell culture in crop improvement. (Sen, S.K. y Giles, K. L., eds.) Proceedings of the international symposium held December 6-10, 1981, at Bose Institute, Calcutta, India. Plenum Press, New York, USA.

Bajaj, Y.P.S. 1990. Cryopreservation of germplasm of vegetatively propagated crops. *Bulletin de la Société Botanique de France, Actualités Botaniques*, , Vol. 137( 3-4):99-114

Engelmann, F. y Takagi, H. (eds.). 2000. Cryopreservation of tropical plant Germplasm: Current research progress and application. Proceedings of an international workshop, Tsukuba, Japan, October, 1998 Japan International Research Center for Agricultural Sciences e International Plant Genetic Resources Institute, Italia.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=529](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=529)

Rao, R. y Riley, K.W. 1994. The use of biotechnology for conservation and utilization of plant genetic resources. *Plant Genetic Resources Newsletter* No. 97:3-20.

Reed, B. M., DeNoma, J. y Chang, Y. 2000. Application of cryopreservation protocols at a clonal genebank. Pp. 246-249 *en* Cryopreservation of tropical plant germplasm: current research progress and application (Engelmann, F y Takagi, H., eds.). Proceedings of an international workshop, Tsukuba, Japan, October, 1998. International Plant Genetic Resources Institute (IPGRI), Rome, Italy.

Wang, B.S.P., Charest, P. y Downie, B. 1993. *Ex situ* storage of seeds, pollen and *in vitro* perennial woody plant species. *Forestry Paper* 113. Organización de las Naciones Unidas para la Agricultura y la Alimentación, Italia.

## Conservación de ADN

Adams, R.P. 1997. Conservation of DNA: DNA banking. Pp. 163–174 *en* Biotechnology and plant genetic resources conservation and use (Callow, J.A., Ford-Lloyd, B.V. y Newbury, H.J., eds.). CAB International, Wallingford, UK.

Hammer, K., Knüpfer, H., Xhuveli, L. y Perrino, P. 1996. Estimating genetic erosion in landraces—two case studies. *Genetic Resources and Crop Evolution* 43:329–336.

Maxted, N., Ford-Lloyd, B.V. y Hawkes, J.G. 1997a. Complementary conservation strategies. Pp. 15–39 *en* plant genetic conservation: the *in situ* approach (Maxted, N., Ford-Lloyd, B.V. y Hawkes, J.G., eds.). Chapman and Hall, London, UK.

- Rao, R. y K.W. Riley. 1994. The use of biotechnology for conservation and utilization of plant genetic resources. *Plant Genetic Resources Newsletter* 97:3-20.
- Sharrock, S. y Engels, J.M.M. 1997. Complementary conservation. Pp. 6–9 *en* INIBAP annual report 1996. INIBAP, Montpellier, France.
- Wilkes, H.G. 1971. Too little gene exchange. *Science* 171:955.

## Conservación en campo

- Engelmann, F. y Engels, J.M.M. 2002. Technologies and strategies for *ex situ* conservation. Pp. 89–103 in *Managing plant genetic diversity* (Engels, J.M.M., Ramanatha Rao, V., Brown, A.H.D. y Jackson, M.T., eds.). CABI Publishing, Wallingford, UK.
- FAO. 1998. The state of the world's plant genetic resources for food and agriculture. FAO, Rome, Italy.
- Heywood, V.H. 1998. The role of botanic gardens in *ex situ* conservation of agrobiodiversity. In *Implementation of the Global Plan of Action in Europe—Conservation and sustainable utilization of plant genetic resources for food and agriculture. Proceedings of the European Symposium, 30 June–3 July 1998, Braunschweig, Germany* (Gass, T., Begemann, F. y Frese, L., eds.). IPGRI, Rome, Italy.
- Laliberté, B. 1997. Botanic garden seed banks/genebanks worldwide, their facilities, collections and network. *Botanic Gardens Conservation News* 2(9):18–23.

## Viabilidad de la semilla

- Bewley, J.D. y Black, M. 1994. *Seeds: Physiology of development and germination*. (2<sup>nd</sup>). Plenum Publishing, New York, USA.
- Ellis, R.H., Roberts, E.H. y Whitehead, J. 1980. A new, more economic and accurate approach to monitoring the viability of accessions during storage in seed banks. *Plant Genetic Resources Newsletter* No. 41:3–18.
- Ellis, R.H., Hong, T.D. y Roberts, E.H. 1985a. *Handbook of seed technology for genebanks, Vol. I: Principles and methodology*. IPGRI, Rome, Italy
- Ellis R.H., Hong, T.D. y Roberts, E.H. 1985b. *Handbook of seed technology for genebanks. Vol. II. Compendium of specific germination information and test recommendations. Handbooks for Genebanks No. 3*. IPGRI, Rome, Italy.
- FAO/IPGRI. 1994. *Genebank standards*. FAO, Rome, Italy, and IPGRI, Rome, Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=424](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=424)  [Archivo pdf](#)
- Hanson J. 1985. *Procedures for handling seeds in genebanks. Practical Manuals for Genebanks No. 1*. IPGRI, Rome, Italy.
- ISTA. 1993. *International rules for seed testing. Seed Science and Technology, 21, Supplement*. International Seed Testing Association, Suiza.
- Roberts EH. 1973. Predicting the viability of seeds. *Seed Science and Technology* 1:499–514

Walters, C. y Engels, J. 1998. The effects of storing seeds under extremely dry conditions. *Seed Science Research* Vol 8:3-8.

## Sanidad y cuarentena vegetal

Allard, R.W. 1990. The genetics of host–pathogen co-evolution: implications for genetic resource conservation. *Journal of Heredity* 81:1–6.

Chan, K.C. 1991. Plant quarantine guidelines for *in vitro* germplasm exchange. Conservation of plant genetic resources through *in vitro* methods (Zakri, A.H., Normah, M.N., Karim, A.G.A.y Senawi, M.T., eds.). Proceedings of the MNCPGR/CSC international workshop on tissue culture for the conservation of biodiversity and plant genetic resources held in Kuala Lumpur, Malaysia, 28-31 May 1990. Forest Research Institute Malaysia and Malaysian National Committee on Plant Genetic Resources. Kuala Lumpur, Malaysia.

FAO/IPGRI. Technical guidelines for the safe movement of germplasm/Guías técnicas para el movimiento seguro de germoplasma.  
<http://www.ipgri.cgiar.org/regions/Americas/programmes/germplasmhealth.htm>

Frison, E.A. y Jackson, G.V.H. 1995. Plant health and germplasm collectors. Pp. 329–340 *en* Collecting plant genetic diversity. Technical guidelines (Guarino, L., Rao, R.V. y Reid R., eds.). CAB International, Wallingford, UK.

Ikin, R. 1991. Plant quarantine principles as related to international trade. *FAO Plant Protection Bulletin* 39(2-3):61-65.


Kahn, R.P. 1991. Plant quarantine and the global transfer of plant genetic resources. Crop genetic resources of Africa. Volume II. Proceedings of an international conference, 17-20 October 1988, Ibadan, Nigeria. International Institute of Tropical Agriculture (IITA). Ibadan, Nigeria.

Lozoya-Saldaña, H. 2001. Phytosanitary and quarantine considerations in the international exchange of plant germplasm. *Revista Mexicana de Fitopatología* 19(2):230-236.


Majumdar, A. 1993. Quarantine to meet the changing scenario in exchange of seed and planting materials. *International Journal of Tropical Plant Diseases* 11(2):127-130.


Mainolfi, P. 1991. Legislative aspects concerning seed quarantine. *Petria* 1(Suplemento 1): 95-98.

Nath, R. 1993. Plant quarantine: Principles and concepts. Pp. 19-24. *en* Plant quarantine and genetic resources management (R.S. Rana, R. Nath, R.K. Khetarpal, N. Gokte y J.S. Bisht, eds.). National Bureau of Plant Genetic Resources. Indian Council of Agricultural Research, India.

Sutherland, J.R., Diekmann, M. y Berjak, P. 2002. Forest tree seed health testing. IPGRI Technical Bulletin No. 6. IPGRI, Rome, Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=865](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=865)  [Archivo pdf](#)

## Conservación del germoplasma a corto/largo plazo

- Allem, A.C. 2001. Managing genebanks: seed base collection examined. *Genetic Resources and Crop Evolution* Vol. 48(4):321-328
- Bonierbale, M., Beebe, S., Tohme, J. y Jones, P. 1997. Molecular genetic techniques in relation to sampling strategies and the development of core collections. Pp. 98-102 *en* Molecular genetic techniques for plant genetic resources. Report of an IPGRI workshop held in Rome, Italy, 9-11 October 1995. International Plant Genetic Resources Institute (IPGRI), Rome, Italy.
- Brown, A.D.H. 1988. The case for core collections. Pp. 136-156 *en* The use of plant genetic resources (A.H.D Brown, O.H. Frankel, D.R. Marshall y J.T. Williams, eds.). Cambridge University Press, Reino Unido.
- Engle, L.M. 1992. Introduction to concepts of germplasm conservation. Pp. 11-17 *en* Germplasm collection, evaluation, documentation and conservation (Chadna, M.L., Anzad Hossain, A.M.K y. Monowar Hossain, S.M., comp.). Memorias del curso realizado en Bangladesh por el Asian Vegetable Research and Development Center, el Bangladesh Agricultural Research Council y el Bangladesh Agricultural Research Institute, mayo 4-6 de 1992. Asian Vegetable Research and Development Center, Taiwan.
- Eberhart, S.A., Roos, E.E. y Towill, L.E. 1991. Strategies for long-term management of germplasm collections. Pp. 135-145 *en* Genetics and conservation of rare plants (Falk, D.A. y Holsinger, K.E., eds.). Oxford University Press, New York, USA.
- FAO. 1996. Global plan of action for the conservation and sustainable utilization of plant genetic resources for food and agriculture. FAO, Rome, Italy.  
<http://www.fao.org/WAICENT/FaoInfo/Agricult/AGP/AGPS/GpaEN/gpatoc.htm>
- FAO/IPGRI. 1994. Genebank standards. FAO, Rome, Italy, and IPGRI, Rome, Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=424](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=424)  Archivo pdf
- Frankel, O.H. 1984. Genetic perspectives of germplasm conservation. Pp. 161-170 *en* Genetic manipulation: Impact on man and society (Arber, W., Llimensee, K., Peacock, W.J. y Starlinger, P., eds.). Cambridge University Press, Cambridge, UK.
- Frankel, O.H., Brown, A.H.D. y Burdon, J.J. 1995. Conservation of plant biodiversity. Cambridge University Press, Reino Unido.
- Hodgkin T, Brown A.HD, van Hintum Th.J.L, y Morales E.A.V. 1995. Core collections of plant genetic resources. Wiley, Chichester, UK.
- Johnson, R.C. y Hodgkin, T. (eds.). 1999. Core collections for today and tomorrow. IPGRI, Rome, Italy.
- National Research Council. 1993. Managing global genetic resources: Agricultural crop issues and policies. Board on Agriculture. National Academic Press, Estados Unidos.
- Paroda, R.S. y R.K. Arora. 1991. Plant genetic resources. Conservation and management: Concepts and approaches. International Board for Plant Genetic Resources. Regional Office for South and Southeast Asia, India.

- Pérez-Ruíz, C. 1997. Conservación *in vitro* de recursos genéticos. En: VI Curso Internacional sobre Conservación y Utilización de Recursos Fitogenéticos para la Agricultura y la Alimentación. Memorias del curso realizado en San Fernando de Henares por el Ministerio de Agricultura, Pesca y Alimentación, el Instituto Nacional de Investigación y Tecnología Agraria y Alimentaria, la Agencia Española de Cooperación Internacional y el Banco Interamericano de Desarrollo, noviembre 3-28 de 1997. Escuela Central de Capacitación Agraria San Fernando de Henares, España.
- Plucknett, D.L., T.J. Williams, N.J.H. Smith y N.M. Anishetty. 1992. Los bancos genéticos y la alimentación mundial. Colección Investigación y Desarrollo N° 21, Instituto Interamericano de Cooperación para la Agricultura y Centro Internacional de Agricultura Tropical, Costa Rica.
- Towil, L.E. y E.E. Roos. 1989. Techniques for preserving of plant germplasm. Pp. 379-403 *en* Biotic diversity and germplasm preservation, global imperatives (Knutson, L. y Stoner, A.K. eds.). Kluwer Academic Publishers, Holanda.
- Towill, L. E. 1993. Long-term preservation of clonal germplasm: advances and concerns. *Journal of Seed Technology*. Vol. 17(2):79-90
- van Hintum, Th.J.L. 1999. The core selector, a system to generate representative selections of germplasm collections. *Plant Genetic Resources Newsletter* 118:64–67.  
<http://www.cgn.wageningen-ur.nl/pgr/about/abstracts/h99b.htm>
- van Hintum, Th.J.L., Brown, A.H.D., Spillane, C. y Hodgkin, T. 2000. Core collections of plant genetic resources. IPGRI Technical Bulletin No.3. IPGRI, Rome, Italy.  
[http://www.ipgri.cgiar.org/publications/pubfile.asp?ID\\_PUB=614](http://www.ipgri.cgiar.org/publications/pubfile.asp?ID_PUB=614)  [Archivo pdf](#)
- van Hintum, Th.J.L., Sackville Hamilton, N.R., Engels, J.M.M. y van Treuren, R. 2001. Accession management strategies: splitting and lumping. Pp. 113–120 *en* Managing plant genetic diversity (Engels, J.M.M., Ramanatha Rao, V., Brown, A.H.D. y Jackson, M.T., eds.). CABI Publishing, Wallingford, UK.

## Monitoreo del germoplasma

- Ellis, R.H., Roberts, E.H. y Whitehead, J. 1980. A new, more economic and accurate approach to monitoring the viability of accessions during storage in seed banks. *Plant Genetic Resources Newsletter* No. 41:3-18.
- Ellis, R.H. 1987. Monitoring the viability of seed accessions. *Plant Genetic Resources Newsletter* No. 71:16-21
- Gilbert, J.E., Lewis, R.V., Wilkinson, M.J. y Caligari, P.D.S. 1999. Developing an appropriate strategy to assess genetic variability in plant germplasm collections. *Theoretical and Applied Genetics* Vol. 98(6/7):1125-1131.
- Vlk, J. y Rogalewicz, V. 1986. Monitoring seed viability in a genebank. *Seed Science and Technology* Vol. 14(2):465-476

## **Distribución del Germoplasma**

Cooper, H.D. 2002. The international treaty on plant genetic resources for food and agriculture. *RECIEL* 11(1):1–16.

FAO. 1994. Código internacional de conducta para la recolección y transferencia de germoplasma vegetal. Organización de las Naciones Unidas para la Agricultura y la Alimentación, Italia.  
<http://www.fao.org/WAICENT/FAOINFO/AGRICULT/AGP/AGPS/PGR/icc/iccs.htm>

Krauss, A. 1985. Germplasm storage and dissemination. Pp. 296-311 *en* Pasture improvement research in Eastern and Southern Africa. International Development Research Centre. Ottawa, Canada.