

T a r o G e n

Taro Genetic Resources: Conservation and Utilisation



Networking and learning together for taro conservation and improvement



A list of publications from Tarogen and partners



Farm Support Association (FSA)

Planting Materials Network (PMN)

Impact of the TaroGen project

The TaroGen project, which ran for five years from 1998, was a unique initiative for the Pacific region highlighting the benefits of networking and collaboration to tackle the problem of taro conservation and improvement in light of the leaf blight outbreak in Samoa in 1993. Although implemented by SPC, the project was a significant partnership between regional and international organisations to assist and support Pacific Island countries. This partnership involved organisations (Biodiversity International (formerly IPGRI), SPC, National Agricultural Research Institute-PNG and HortResearch), universities (University of the South Pacific, University of Technology-PNG, Queensland University of Technology and University of Queensland) and non-governmental organisations (Planting Materials Network and Farm Support Association). Funding for this collaboration was provided by AusAID, ACIAR and NZAID.

The main impacts of the project included:

- Development of a regional strategy to collect and describe taro which resulted in a database of over 2,000 taro accessions;
- Technical assistance from UQ and IPGRI scientists in analysis of morphological and molecular data which allowed the identification of 220 taro accessions as a core collection, representative of the broad diversity of taro in the region;
- Assistance provided to SPC to establish the Regional Germplasm Centre as a centre of excellence for research on conservation methods and germplasm distribution;
- Regional NGOs, PMN and FSA, providing important information on the in situ conservation of taro which illustrated that on-farm conservation of taro is a feasible method for some countries;
- Advances in taro virus characterisation and diagnostics by scientists at QUT which now allow the safe international transfer of taro germplasm;
- Crop improvement programmes established at NARI and USP-Alafua which have resulted in the production and distribution of leaf blight resistant taro varieties to farmers;
- Enhanced skills and capacity of many Pacific Island scientists through on-going mentoring with scientists of international repute. This included the completion of 10 postgraduate programmes; and
- Finally, through its many diverse activities and collaborations the Project has significantly added to the body of knowledge that exists on taro conservation and improvement as evident from the list of publications included in this document.



TaroGen partner publications

Journal papers

- Hunter, D.G., Pouono, K and Semisi, S (1998) The impact of taro leaf blight in the Pacific with special reference to Samoa. *Journal of South Pacific Agriculture* **5**, 44-56.
- Hunter, D.G. and Pouono, K. (1998) Evaluation of exotic taro cultivars for resistance to taro leaf blight, yield and quality in Samoa. *Journal of South Pacific Agriculture* **5**, 39-43.
- Hunter, D.G., Iosefa, T., Delp, C.J., Fonoti, P. and Singh, D. (in press) Participatory evaluation of introduced taro (*Colocasia esculenta* (L.) Schott) varieties in Samoa. *Tropical Agriculture*
- Iramu, E.T., Singh, D., Wagih, M.E., Akanda, S. and Hunter, D. (In press) Genetic characterization of selected taro (*Colocasia esculenta*) genotypes from cycle-3 breeding progeny. *Journal of South Pacific Agriculture*
- Iramu, E.T., Singh, D., Wagih, M.E., Akanda, S. and Hunter, D. (In press) Evaluation of selected taro (*Colocasia esculenta*) genotypes for leaf blight resistance, corm yield and eating quality. *Journal of South Pacific Agriculture*
- Macanawai, A.R. and Hunter, D.G. (2001) Shedding of taro (*Colocasia esculenta* (L.) Schott.) flower pollens in Samoa - An alternative approach. *Journal of South Pacific Agriculture* **8** (2), 9-12.
- Macanawai, A.R., Ebenebe, A.A., Hunter, D.G. and Harding, R (2004) Distribution and alternative hosts of taro bacilliform badnavirus in Samoa. *PNG Journal of Agriculture, Forestry and Fisheries* **47** (1/2), 11-16.
- Macanawai, A.R., Ebenebe, A.A., Hunter, D.G., Devitt, L.C., Hafner, G. and Harding, R. (2005) Investigations into seed and mealybug transmission of Taro bacilliform virus. *Australasian Plant Pathology* **34**, 73-76.
- Mace, E.S. & Godwin, I.D. (2002) Development and characterisation of polymorphic microsatellite markers in taro, *Colocasia esculenta* (L.) Schott. *Genome* **45** (5), 823-832.
- Mace, E.S., Mathur, P.N., Izquierdo, L., Hunter, D. Taylor, M.B., Singh, D. DeLacy, I.H., Jackson, G.V.H. & Godwin, I.D. (2006) Rationalisation of taro germplasm collections in the Pacific Island Region using SSR markers. *Plant Genetic Resources* **4**, 210-220.
- Okpul, T., Singh, D., Wagih, M.E. and Hunter, D. (2002) Genetic resources of taro (*Colocasia esculenta* (L.) Schott) in Papua New Guinea: a review. *PNG Journal of Agriculture, Forestry and Fisheries* **45** (1&2), 33-45.
- Okpul, T., Singh, D., Gunua, T. and Wagih, M.E. (2004) Assessment of diversity using agro-morphological traits for selecting a core sample of the PNG taro (*Colocasia esculenta*) collection. *Genetic Resources and Crop Evolution* **51**, 671-678
- Okpul, T., Mace, E.S., Godwin, I.D., Singh, D. and Wagih, M.E. (2005) Evaluation of variability among breeding lines and cultivars of taro (*Colocasia esculenta*) in Papua New Guinea using ISSR fingerprinting and agro-morphological characterization. *Plant Genetic Resources Newsletter* **143**: 8-16.
- Okpul, T., Singh, D., Wagih, M., Wiles, G. and Hunter, D. (in press) First release of taro (*Colocasia esculenta*) leaf blight resistant varieties in Papua New Guinea. *Crop Science*
- Sant, R., Taylor, M. and Tyagi, A. (2006) Cryopreservation of *in vitro*-grown shoot tips of tropical taro (*Colocasia esculenta* var. *esculenta*) by vitrification. *CryoLetters* **27**(3), 133-142.
- Reville, P., Trinh, X., Dale, J.L., and Harding, R.M. (2005) Taro vein chlorosis: characterisation and variability of a new Nucleorhabdovirus. *Journal of General Virology* **86**, 491-499.
- Reville, P., Jackson, G.V.H., Hafner, G.J., Yang, I., Maino, M.K., Dowling, M.L., Devitt, L.C., Dale, J.L. and Harding, R.M. (2005) Incidence and distribution of viruses of taro (*Colocasia esculenta*) in Pacific Island countries. *Australasian Plant Pathology* **34**, 327-331.

DaSilva, E.J. and Taylor, M.B. (1998) Island Communities and Biotechnology In: *The Electronic Journal of Biotechnology* **1** No. 1.

Singh, D. and Okpul, T. (2000) Evaluation of 12 taro (*Colocasia esculenta* (L.) Schott) leaf blight resistant clones for yield and eating quality in Papua New Guinea. *SABRAO Journal of Breeding and Genetics* **32**, 39-45.

Singh, D., Okpul, T., Gunua, T. and Hunter, D. (2002) Inheritance of resistance to leaf blight in taro cultivar 'Bangkok'. *Journal of South Pacific Agriculture* **8** (1), 22-25.

Singh, D., Guaf, T., Okpul, T., Wiles, G. and Hunter, D. (2006) Taro (*Colocasia esculenta*) variety release recommendations for Papua New Guinea based on multi-location trials. *New Zealand Journal of Crop and Horticultural Science* **34**, 163-171.

Taylor, M.B. (2000) New regional genebank in Fiji was made-to-order for Pacific island nations. *Diversity* **16**, 96-98.

Taylor, M.B. (2000) Plant Cell Culture In: Encyclopedia of Life Sciences.

Tyagi, A. P., Taylor, M. and Deo, P.C. (2004) Seed germination and seedling development in taro (*Colocasia esculenta*). *The South Pacific Journal of Natural Science* **22**, 61-65.

Yang, I.C., Hafner, G.J., Dale, J.L. and Harding, R.M. (2003) Genomic characterisation of *Taro bacilliform virus*. *Archives of Virology* **148**, 937-949.

Yang, I.C., Hafner, G.J., Revill, P.A., Dale, J.L., and Harding, R.M. (2003) Sequence diversity of South Pacific Isolates of *Taro bacilliform virus* and the development of a PCR-based diagnostic test. *Archives of Virology* **148**, 1957-1968.



Chapters in books

Godwin I.D, Mace ES & Nurzuhairawaity (2001) Genotyping Pacific Island Taro (*Colocasia esculenta* (L.) Schott) Germplasm. In: *Plant Genotyping - the DNA Fingerprinting of Plants* (Henry, R. ed), pp. 109-128. CAB International.

Hunter D.G., T. Iosefa, C.J. Delp and P. Fonoti (2001) Beyond taro leaf blight: a participatory approach for plant breeding and selection for taro improvement in Samoa. *Participatory Plant Breeding and Participatory Plant Genetic Resource Enhancement*, Pokhara, Nepal, 1st to 5th May 2000. Cali, Colombia: CGIAR Systemwide Program on Participatory Research and Gender Analysis for Technology Development and Institutional Innovation, Centro Internacional de Agricultura Tropical. pp. 219-217

Mace, E., Mathur, P., Godwin, I.D., DeLacy, I., Hunter, D., Taylor, M., Singh, D. and Jackson, G.V.H (*in press*) Development of a Regional Core Collection (Oceania) for Taro, *Colocasia esculenta* (L.) Schott., Based on Molecular and Phenotypic Characterization. In, *The Global Diversity of Taro: Ethnobotany and Conservation* (V. Ramanatha Rao, Peter J. Matthews and Pablo B. Ezyaguire, eds) IPGRI and Minpaku. National Museum of Ethnology, Osaka, Japan) Rome and Osaka.

Rao, V.R., Guarino, L., Taylor, M. and Hunter, D. (*in press*) Towards a Global Taro Genetic Resources Conservation Strategy . In, *The Global Diversity of Taro: Ethnobotany and Conservation* (V. Ramanatha Rao, Peter J. Matthews and Pablo B. Ezyaguire, eds) IPGRI and Minpaku. National Museum of Ethnology, Osaka, Japan) Rome and Osaka.

Singh, D., Hunter, D., Iosefa, T., Fonoti, P., Okpul, T, and Delp, C. (*in press*) Improving Taro Production in the South Pacific through Breeding and Selection. In, *The Global Diversity of Taro: Ethnobotany and Conservation* (V. Ramanatha Rao, Peter J. Matthews and Pablo B. Ezyaguire, eds) IPGRI and Minpaku. National Museum of Ethnology, Osaka, Japan) Rome and Osaka.

Taylor, M.B., and Murikami, T. (1998) Current Status of Cryopreservation Research and Future Perspectives of its Application in the South Pacific. In *Cryopreservation of Tropical Plant Germplasm: Current Research, Progress and Application* (Eds.Engelmann, F., and Takagi, H.) JIRCAS International Agriculture Series No 8 IPGRI 2000.

Taylor, M., Hunter, D.G., Ramanatha Rao, V., Jackson, G.V.H., Sivan, P. and Guarino, L. (*in press*) Taro Collecting and Conservation in the Pacific Region. In, *The Global Diversity of Taro: Ethnobotany and Conservation* (V. Ramanatha Rao, Peter J. Matthews and Pablo B. Ezyaguire, eds) IPGRI and Minpaku. National Museum of Ethnology, Osaka, Japan) Rome and Osaka.



Conference papers

- Fonoti P., Hunter D., Singh D., Okpul T., Delp C., Pouono K. and Sivan P. (1999) Breeding for resistance to taro leaf blight in the South Pacific. *Proceedings of the 12th Biennial Australasian Plant Pathology Society Conference*. Canberra, Australia, 27-30 September, p. 248.
- Fullerton, R.A. and Tyson, J.L. (2004) The biology of *Phytophthora colocasiae* and implications for its management and control. In L. Guarino, M. Taylor and T. Osborn (eds.) *Proceedings of 3rd Taro Symposium*, Secretariat of the Pacific Community.
- Godwin, I.D, Mace, E.S., Mathur, P.N. and Izquierdo, L. (2006). Applications of DNA markers to management of taro (*Colocasia esculenta* (L.) Schott) genetic resources in the Pacific Island region. In L. Guarino, M. Taylor and T. Osborn (eds.) *Proceedings of 3rd Taro Symposium*, Secretariat of the Pacific Community. pp 64-68.
- Harding, R.M., Revill, P., Hafner, G., Yang, I., Maino, M.K., Devitt, L.G., Dowling, M.L. and Dale, J.L. (2004) Characterisation of taro viruses and the development of diagnostic tests. In L. Guarino, M. Taylor and T. Osborn (eds.) *Proceedings of 3rd Taro Symposium*, Secretariat of the Pacific Community.
- Hunter, D.G., Sivan, P., Amosa, F. and Pouono, K. (1998) Taro leaf blight and its management in Samoa. *Proceedings of 7th International Congress of Plant Pathology*, Vol. 3, p 245.
- Hunter, D.G., Delp, C., Iosefa, T. and Metai, A. (2000) Samoan taro growers are battling taro leaf blight, *Phytophthora colocasiae*. Paper presented at *1st Asian Conference on Plant Pathology*, 25-28 August, 2000, Beijing, China.
- Hunter, D.G., Iosefa, T. Delp, C.J & Fonoti, P. (2000) Improving taro production in Samoa through breeding and selection. In: *Proceedings of the Twelfth Symposium of the International Society of Tropical Root Crops: Potential of Root Crops for Food and Industrial Resources* (Makoto Nakatani and Katsumi Komaki, eds.). Tsukuba, Ibaraki, Japan. 570-575.
- Hunter, D., Delp, C.J., Iosefa, T. and Metai, A.F. (2001) Samoan taro growers battling taro leaf blight. *Proceedings of the 13th Biennial Australasian Plant Pathology Society Conference*. Cairns, Australia, 24-28 September, p.324.
- Hunter, D.G, T. Iosefa, C.J. Delp, P. Fonoti, T. Okpul and D. Singh. (2002) Farmer participatory approaches to taro (*Colocasia esculenta*) improvement in the South Pacific. In: *Plant Breeding for the 11th Millennium*. J.A. McComb (Ed). *Proceedings 12th Australasian Plant Breeding Conference*, Perth Western Australia, 15-20 September 2002. pp. 620-62.
- Iosefa, T. Delp, C.J., Hunter, D.G. and Fonoti, P. (2004) Introduced taro cultivars - on-farm evaluation in Samoa. In L. Guarino, M. Taylor and T. Osborn (eds.) *Proceedings of 3rd Taro Symposium*, Secretariat of the Pacific Community, 185-188.
- Iramu, E.T., Wagih, M.E., Akanda, S., Singh, D. and Hunter, D. (2001) Screening selected genotypes of cycle 3 breeding population for resistance to taro leaf blight. *Proceedings of the 13th Biennial Australasian Plant Pathology Society Conference*. Cairns, Australia, 24-28 September, p.326.
- Jackson, G.V.H. (2004) Taro research and development - progress since the last taro symposium and challenges for the future. . In L. Guarino, M. Taylor and T. Osborn (eds.) *Proceedings of 3rd Taro Symposium*, Secretariat of the Pacific Community.
- Macanawai, A.R., Dale, J.J., Hunter, D., Hafner, G.R. and Harding, R.M. (2001) The epidemiology of taro bacilliform virus in Samoa. *Proceedings of the 13th Biennial Australasian Plant Pathology Society Conference*. Cairns, Australia, 24-28 September, p.226.
- Maemouri R.K. and Jansen, T. (2004) Promoting on-farm conservation through taro diversity fairs in the Solomon Islands. In L. Guarino, M. Taylor and T. Osborn (eds.) *Proceedings of 3rd Taro Symposium*, Secretariat of the Pacific Community.
- Okpul, T., Singh, D., Wagih, M., Wiles, G. and Hunter, D. (2002) Release of new taro (*Colocasia esculenta* L. Schott) varieties with high yield and resistance to leaf blight In: *Plant Breeding for the 11th Millennium*. J.A. McComb (Ed). *Proceedings 12th Australasian Plant Breeding Conference*, Perth Western Australia, 15-20 September 2002. pp. 421-423.

Singh D., Okpul T., Gunua T., Iramu E., Wagih M., Hunter D.G., Delp C., Fonoti P., Sivan P. and Jackson G.V.H. (2000) Breeding taro (*Colocasia esculenta*) for durable resistance to leaf blight (*Phytophthora colocasiae*) in the South Pacific. In: *Proceedings Durable Disease Resistance Symposium*, Wageningen, The Netherlands. P. 20.

Singh, D., Kaushal, P. and Singh, M. (2001) Impacts of biotechnology on food security and food quality. In: *Proceedings Papua New Guinea Food and Nutrition 2000 Conference (26-30 June, Lae, PNG)*. ACIAR Proceedings No. 99, 603-608.

Singh, D., Okpul, T., Iramu, E., Wagih, M. and Sivan, P. (2001) Breeding taro for securing PNG traditional staple. In: *Proceedings Papua New Guinea Food and Nutrition 2000 Conference (26-30 June, Lae, PNG)*. ACIAR Proceedings No. 99, 749-751

Singh D., Okpul T., Gunua, T. and Hunter D. (2001) Inheritance of resistance to leaf blight in taro cultivar 'Bangkok'. *Proceedings of the 13th Biennial Australasian Plant Pathology Society Conference*. Cairns, Australia, 24-28 September, p.325.

Singh D., Hunter, D., Okpul T., Iosefa, T., Fonoti, P. and Delp, C. (2001) Taro breeding strategies to control leaf blight disease in South Pacific countries. *Proceedings of the 13th Biennial Australasian Plant Pathology Society Conference*. Cairns, Australia, 24-28 September, p.375.

Singh, D., Mace, E., Okpul, T., Godwin, I.D., Mathur, P.N., Taylor, M., Kambuou, Ramanatha Rao, V. and Hunter, D. (2002) Collection, characterization and conservation of taro (*Colocasia esculenta*) genetic resources for efficient utilization in breeding. In: *Plant Breeding for the 11th Millennium*. J.A. McComb (Ed). Proceedings 12th Australasian Plant Breeding Conference, Perth, Western Australia, 15-20 September 2002. pp. 251-253.

Singh, D., Okpul, T. and Hunter, D.G. (2004) Taro breeding programme in Papua New Guinea – achievements, challenges and constraints. *Proceedings of the Third Taro Symposium*, 21-23 May 2003, Nadi, Fiji Islands. Secretariat of the Pacific Community and International Plant Genetic Resources Institute, 181-184.

Sivan, P. (2000) Taro germplasm collection, conservation and utilisation in the Pacific Islands. Paper presented at the *12th Symposium of the International Society for Tropical Root Crops*, 10-16 September, 2000, Tsukuba, Japan.

Taylor, M.B. (2000) The establishment of a regional germplasm centre in the Pacific. Paper presented at the *International Conference on Science and Technology for Managing Plant Genetic Diversity in the 21st Century*. 12-16 June, 2000, Malaysia.

Taylor, M. Tuia, V., Sant, R., Lesione, R., Prasad, R., Prasad, R.L. and Vosaki, A. (2004) Using *in vitro* techniques for the conservation and utilisation of *Colocasia esculenta* (taro) in a regional genebank. In L. Guarino, M. Taylor and T. Osborn (eds.) *Proceedings of 3rd Taro Symposium*, Secretariat of the Pacific Community.

Tyson, J.L. and Fullerton, R.A. (2003) Mating types of *Phytophthora colocasiae* strains from the Pacific region, India and south-east Asia. In the *8th International Congress of Plant Pathology* (Abst. 28.26 349). Christchurch, New Zealand.



Workshop papers

Anonymous (1998a) Proceedings of the Taro Breeding Workshop; AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 21pp.

Anonymous (1998b) Proceedings of the Taro Planning Workshop; AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 20 pp.

Anonymous (1999a) Proceedings of the Taro Collecting Strategy for Pacific Islands Workshop; AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 21 pp.

Anonymous (1999b) Proceedings of the Taro Conservation Strategy Workshop. AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 25 pp.

Anonymous (2002a) Regional On-Farm Conservation Workshop. AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 191 pp.

Anonymous (2002b) Taro Leaf Blight Awareness Raising Workshop. AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 20 pp.

Delp, C. and Hunter, D.G. (2001) Traditional farming systems and pest management. *Proceedings of the Regional Workshop on the Improvement and Development of Traditional Farming Systems for the South Pacific*. Institute for Research, Extension and Training in Agriculture/Technical Centre for Agricultural and Rural Cooperation (CTA). 26-36.

Fonoti, P., Hunter, D.G. and Delp, C. (2001) Participatory approaches for plant breeding and selection to improve taro cropping systems in Samoa. *Proceedings of the Regional Workshop on the Improvement and Development of Traditional Farming Systems for the South Pacific*. Institute for Research, Extension and Training in Agriculture/ Technical Centre for Agricultural and Rural Cooperation (CTA). 91-94.

Fullerton B, Hunter, D.G. and Jackson, G. (1998) *Phytophthora colocasiae*: the pathogen and its epidemiology. *Proceedings of the Taro Breeding Workshop; AusAID/SPC Taro Genetic Resources: Conservation and Utilisation*. Secretariat of the Pacific Community, New Caledonia, p. 8-9.

Hunter, D. (2001) Collection, characterization and documentation of taro collections from the Pacific. *Proceedings of the Taro Conservation Strategy Workshop*. AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Suva, Fiji, September 5-7, p. 5-7.

Iramu, E.T., Fullerton, R.A., Akanda, S., Wagih, M.E. and Singh, D. (2002) Estimating reliability of different screening methods for taro leaf blight resistance. In *Abstracts First PNG Crop Protection Workshop*. Lae, PNG, 12-14 February 2002. p. 7.

Pouono K. and Hunter D.G. (1998) Taro breeding and research in Samoa. *Proceedings of the Taro Breeding Workshop; AusAID/SPC Taro Genetic Resources: Conservation and Utilisation*. Secretariat of the Pacific Community, New Caledonia, p 9-10.

Singh, D., Okpul, T., Taylor, M.B. and Hunter, D. (2001) Taro seed storage and germination protocols used by the Papua New Guinea breeding program. *Proceedings of the Taro Conservation Strategy Workshop*. AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Suva, Fiji, September 5-7, 59-60.

Singh, D., Okpul, T., Gunua, T., Iosefa, T. and Hunter, D. (2002) Exploiting durable resistance for controlling taro leaf blight disease. In, *Abstracts First PNG Crop Protection Workshop*, Lae, PNG, 12-14 February 2002. 8 pp.

Taylor, M.B. (1999). Regional Genebanks: Practical strategies for sharing, caring and funding. Paper presented at the ACIAR Workshop on Regional Cooperation in Conservation and Management of Plant Genetic Resources in the Pacific Region 30-31 March 1999, Lae, PNG.

Manuals and guidelines

Fullerton, B., Singh, D. and Hunter, D.G. eds (2002) Taro Pathology and Breeding. AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, Suva, Fiji. 85 pp.

Singh, D., Hunter, D., Iosefa, T. and Okpul, T. (2001) Guidelines for Undertaking On-Farm Taro Breeding Trials in the South Pacific. AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, Suva, Fiji. 39 pp.

Technical bulletins/newsletters

Brunt, J., Hunter, D.G. and Delp, C. (2001) Taro Leaf Blight - An Updated Bibliography. Secretariat of the Pacific Community, Suva, Fiji.

Hunter, D.G. (2001) Taro Genetic Resources: Conservation and Utilisation (TaroGen) - Networking in Pacific Island countries. *Agricultural Research and Extension Network Newsletter* **44**, p. 10.

Hunter, D.G. and Iosefa, T. (2002) Improving research, extension and farmer linkages to revive taro production in Samoa. *Agricultural Research and Extension Network Newsletter* **46**, p. 10.

Okpul, T. and Singh, D. (2001) NARI Resistant Taro Hybrids. *NARI Extension Booklet Series*. Booklet No. BuB 01.

Okpul, T., Singh, D., Wagih, M., Wiles, G. and Hunter, D. (2002) Improved taro varieties with resistance to taro leaf blight for PNG farmers. *NARI Technical Bulletin Series, Technical Bulletin No. 3*, 11pp.

Okpul, T., Singh, D., Wiles, G. and Hunter, D. (2002) NARI releases three new hybrid taro varieties. *Fresh Produce News*, **158**, 2-3.

Okpul, T., Singh, D. and Guaf, J. (2000) Simple rapid propagation techniques for taro multiplication. *Fresh Produce* **147**: 8-11.

Rogers, S., Iosefa, T., Hoponoa, T., Hazelman, S. and Hunter, D.G. (2000) Farmer innovation in the South Pacific. *ILEIA Newsletter* **16**, 7-8.

Singh, D., Okpul, T. and Guaf, J. (1999) Assessing genetically improved taro lines at NARI. *Fresh Produce* **144**, 6-7.

Singh, D. (2001) TaroGen: Networking for Taro Improvement in the Pacific. *Fresh Produce* **155**, 1-3.

Singh, D., Okpul, T. and Guaf, J. (2001) Efficient Propagation Techniques for Taro Multiplication. *NARI Extension Series*. Booklet No. 3.



Popular magazines/newspapers

- Hunter, D. G. and Fonoti, P. (2000) Taro leaf blight – tackling the problem as partners. *Focus*, July 2000,18-20 (Development magazine).
- Singh, D. and Okpul, T. (1999) Genetic improvement of PNG’s traditional staple. *Post Courier* (dated May 5). p.33.
- Singh, D. (2000) Building up taro gene pool for better yield. *The National* (Agriculture supplement dated March 16). p.14.
- Singh, D. (2000) Focus on the humble taro. *The National* (Agriculture supplement dated July 5). p.3.
- Singh, D. (2002) Improving local taro for market. *The National* (Agriculture supplement dated May 9). p.22

Postgraduate theses

- Alberto M. (2002) ISSR Fingerprinting of the Fijian Taro Germplasm Collection to Assess Genetic Erosion. MSc Thesis. School of Land, Crop and Food Sciences. University of Queensland.
- Fonoti, P (2004) Evaluation of Selected Taro Varieties and Clones for Resistance to Taro Leaf Blight. MAg Thesis. University of the South Pacific.
- Iramu, E. (2005) Breeding Taro (*Colocasia esculenta*) for Leaf Blight Resistance. MPhil Thesis. University of Technology. Papua New Guinea.
- Macanawai, A. (2003) Epidemiology of Taro Bacilliform Virus in Samoa. MAg Thesis. University of the South Pacific.
- Maino, M.K. (2003) The Development of a Serological-Based Diagnostic test for Dasheen Mosaic Virus. MSc Thesis. School of Life Sciences. Queensland University of Technology.
- Nurzuhairawaty (2001) Applications of DNA Fingerprinting to Assessing Genetic Diversity in Pacific Island Taroos. MSc Thesis. School of Land, Crop and Food Sciences. University of Queensland.
- Okpul, T. (2002) Genetic Studies on Taro (*Colocasia esculenta* (L.) Schott): Diversity and Adaptability of Selected Genotypes. MPhil. University of Technology. Papua New Guinea.
- Robert Plak Pawilnga (2003) Investigation of Methods and Parameters for Transient and Stable Transformation of Taro. MSc Thesis. School of Land, Crop and Food Sciences. University of Queensland.
- Sant, R. (2001) Cryopreservation of Taro (*Colocasia esculenta* var. *esculenta*). MSc Thesis. School of Pure and Applied Sciences. University of the South Pacific.
- Yang, I.C. (2003) Characterisation of Taro Bacilliform Virus. PhD Thesis. School of Life Sciences. Queensland University of Technology.



Miscellaneous project publications

Anonymous (1999a) Taro Genetic Resources Committee Meeting (Lae, March 1999); AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 21 pp.

Anonymous (1999b) In-Situ Conservation of Taro in Vanuatu: A Feasibility Study. AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 25 pp.

Anonymous (1999c) Annual Report 1998/1999; AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 26 pp.

Anonymous (1999d) Taro Genetic Resources Committee Meeting (Suva, October 1999); AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 26 pp.

Anonymous (2000) Taro Genetic Resources Committee Meeting (Suva, Fiji 28-29 November 2000); AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 20 pp.

Anonymous (2001a) Taro Genetic Resources Committee Meeting (Nadi, Fiji May 2001); AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia, 17 pp.

Anonymous (2001b) Taro Genetic Resources Committee Meeting (Apia, Samoa November 2001); AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia.

Anonymous (2001c) Annual Report 1999/2000; AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia.

Anonymous (2001d) Annual Report 2000/2001; AusAID/SPC Taro Genetic Resources: Conservation and Utilisation. Secretariat of the Pacific Community, New Caledonia.

Anonymous (2001e) Safeguarding Pacific Island taro - an important Pacific Island root crop. SPC Annual Report 2001, 16-19

Delp, C., Hunter, D.G. and Pouono, K. (1999) USP Taro Breeders Club: an innovative and participatory approach to improving taro in Samoa. *IRETA's South Pacific Agricultural News*.

Fullerton, R.A., Tyson, J., Hunter, D.G. and Fonoti, P. (2000) Plant Pathology Progress Report. In. Taro Genetic Resources Committee Meeting. Lae, Papua New Guinea, 18 April 2000

Hunter, D.G. and Delp, C. (1999) Breeders club helps save taro. *The University of the South Pacific Bulletin* **32**, 2

Hunter, D.G. and Delp, C. (2000) Taro returning to Samoa. *IRETA's South Pacific Agricultural News* **17**, 4-5.

Hunter, D.G. (2000) Taro diversity fairs. *SPC Agricultural News* **9**, p. 7.



Further information

Project website

The TaroGen website includes a vast array of information related to the project and its components: taro conservation and improvement. Some of the above publications are available to download at this site.

Go to: <http://www.spc.int/tarogen/>

Project-related website

Third Taro Symposium

In 2003, the collaborating partners involved in TaroGen organised the Third Taro Symposium at Nadi, Fiji, which brought together scientists from all over the world to review progress in taro research and development and explore options for future directions.

Go to: <http://www.spc.int/cis/tarosym>

Regional Germplasm Centre

The website of the SPC Regional Germplasm Centre contains information on conservation methods and current research. Data sheets also exist on some of the TaroGen breeding lines as well as accessions held in the taro core collection.

Go to: <http://spc.int/rgc/>

The Pacific Agricultural Plant Genetic Resources Network (PAPGREN)

Website contains much information related to taro and TaroGen.

Go to: <http://spc.int/pgr/>

Genetic Resources Thematic Group

This is one of the thematic groups within Land Resources Division of SPC dealing specifically with agricultural genetic resources.

Go to: http://www.spc.int/lrd/genetic_resources.htm

Contacts

Many of the scientists who collaborated on TaroGen continue to work in their respective areas of expertise and will be happy to discuss technical aspects of the project with those interested. They can also provide updates on project-related activities and copies of the publications listed above.

For relevant information contact:

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