## 5. CONCLUSIONS

- 1. Gymnema sylvestre could be propagated both by seeds and vegetative means.
- 2.Germination percentage of seeds was found to be higher (92 %) in coir dust media than the other media tested.
- 3. Seeds could be stored at room temperature (30 °C) for 2 months without loosing viability.
- 4. Semi- hard wood cuttings performed better than soft wood and hard wood cuttings.
- 5. The best rooting media was found to be a mixture of top soil, sand and compost (1:1:1 by volume).
- 6. The highest rooting was achieved by watering once in two days.





## 6. FUTURE RECOMENDATIONS

Further studies need to be conducted on the following;

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- 1.Germination dynamics of seeds, particularly considering the factors affecting the storage capacity of seeds.
- 2. Seedling survival under different conditions (i.e. light, moisture etc.) and field establishment.



## 7. REFERENCES

a corner of

Agelet, A., Bonet, M.A. and Valles, J., (2000). Homegardens and their role as a main source of medicinal plants in mountain regions of Catalonia (Iberian Peninsula). *Economic Botany* 54, pp. 295-309.

Ahmad, B., (1998). Plant exploration and documentation in view of land clearing in Sabah. In Nair, M.N.B. and Ganapathi, N. eds., Medicinal Plants. Cure for the 21<sup>st</sup> Century. Biodiversity Conservation and Utilization of Medicinal Plants. Proceedings of a seminar, 15-16 October 1998. Serdang, Malaysia, Faculty of Forestry, Universiti Putra Malaysia. pp. 161-162.

Anon, (1978). The Promotion and Development of Traditional Medicine. World Health Organization Technical Report, Geneva, 622, pp. 10.

Anon, (2002b). Assessing the impacts of commercial captive breeding and artificial propagation on wild species conservation. IUCN/SSC Workshop. 7-9.12.2001, Jacksonville. Draft workshop report. Cambridge, IUCN/SSC Wildlife Trade Programme (Unpublished report).

Attygala, J., (1917). Sinhalese Materia Medica, Gunesena and Co., Colombo. pp.10-22.

Begum, F., (2002). Ex situ conservation of medicinal plants for primary healthcare in Laxmipur District, Bangladesh. In Paper at a Workshop on Wise Practices and Experiential Learning in the Conservation and Management of Himalayan Medicinal Plants, Kathmandu, Nepal, 15-20 December 2002, supported by the Ministry of Forest and Soil Conservation, Nepal, the WWF-Nepal Program, Medicinal and Aromatic Plants Program in Asia (MAPPA), IDRC, Canada, and the WWF-UNESCO People and Plants Initiative.

Bernáth, J., (1999). Biological and economical aspects of utilization and exploitation of wild growing medicinal plants in middle and south Europe. In Caffini, N., Bernath, J., Craker, L., Jatisatienr, A. and Giberti, G. eds., Proceedings of the Second World Congress on Medicinal and Aromatic Plants for Human Welfare. WOCMAP II. Biological

resources, sustainable use, conservation and ethnobotany., Leuven, Netherlands, ISHS (Acta Horticulturae 500). pp. 31-41

Bramwell, D., (2002). How many plant species are there? -Plant Talk 28, pp. 32-34.

a cray of

Caldecott, J.O., Jenkins, M.D., Johnson, T. and Groombridge, B., (1994). Priorities for Conserving Global Species Richness and Endemism. In World Conservation Monitoring Center, Biodiversity Series No. 3 (Collins, N.M. ed.). World Conservation Press, Cambridge, UK. pp. 17.

Cunningham, A.B., (1993). African medicinal plants. Setting priorities at the interface between conservation and primary healthcare. - Paris, UNESCO (People and Plant Working Paper 1).

Dassanayake, M.D. and Fosberg, F.R., (1980-2000). A Revised Handbook to the flora of Ceylon, Amerind Publishers, New Delhi, Vol. 1, pp 14.

Dev, S., (1999). Ancient-modern concordance in Ayurvedic plants: some examples. Environmental Health Perspectives 107, pp. 783-789.

University of Moratuwa, Sri Lanka.

Dold, T. and Cocks, M., (2001). The trade in medicinal plants in the Eastern Cape Province, South Africa. TRAFFIC Bulletin 18, pp. 11-13.

Duke, J.A. and Ayensu, E.S., (1985). Medicinal plants of China. Vol. 2, Algonac, USA, Reference Publications (Medicinal Plants of the World 4).

Edmand, J.B., (1997). Fundarmentals of horticulture. 4<sup>th</sup> ed, Tata Mc. Graw Hill Publishing Company, New Delhi. pp. 181.

Eisenberg, D.M., Kessler, R.C., Foster, C., Norlock, F.E., Calkins, D.R. and Delbanco, T.L., (1993). Unconventional medicines in the United States. -The New England Journal of Medicine 328, pp. 246-252.

Erwin, J.E., Schwarze, D. and Donahu, R., (1997). Factors affecting propagation of clemants by stem cuttings. Horti. Technology. 7, pp. 408-410.

\* MAY

Evan, H., (1953). Physiological aspects of the propagation coccoa from cuttings. Report of the 13<sup>th</sup> International Horticultural Congress, London. 2, pp. 1179-1196.

FAO, (1995). Non-wood forest products for rural income and sustainable development. - Rome (Non-wood Forest Products 7).

Farnsworth, N. R. and Soejarto, D. D., (1991). Global importance of medicinal plants. In The conservation of medicinal plants (ed. Akerele, O., Heywood, V. and Synge, H.),. Cambridge University Press, Cambridge, UK. pp. 25-51

Govaerts, R., (2001). How many species of seed plants are there? -Taxon 50, pp. 1085-1090.

Grange, R.I. and Loach, K., (1983). The water economy of unrooted leafy cuttings. J. Hort. Sci. 58, pp. 9-17.

Groombridge, B. and Jenkins, M., (1994). Biodiversity data sourcebook- Cambridge, UK, World Conservation Press (WCMC Biodiversity Series 1).

Grünwald, J. and Bütte, K., (1996). The European phytotherapeutics market. -Drugs Made In Germany 39, pp. 6-11.

Gunatilleke, I.A.U.N. and Gunatilleke, C.V.S., (1990). Floristic Richness in Sri Lanka. Its Distribution and Conservation, Conservation Biology, 4(1), pp. 21-31.

Hamilton, A. C., (1997). Threats to plants: an analysis of Centers of Plant Diversity. In Conservation into the 21<sup>st</sup> Century, vol. Proc. 4th International Botanic Gardens Conservation Congress (ed. Touchell, D. H. and Dixon, K. W.), Kings Park and Botanic Garden, Perth, Australia. pp. 309-322.

Hartmann, H.T., Kester, D.E., Davies, J. and Geneve, R.C., (1997). Plants propagation: Principles and practices. 6<sup>th</sup> ed. Prentice Hall Inc., Upper saddle river, NJ. pp 149-154.

\* SHIP

He Shan-An and Ning Sheng, (1997). Utilization and conservation of medicinal plants in China with special reference to *Atractylodes lancea*. In Bodeker, G., Bhat, K.K.S., Burley, J. and Vantomme, P. eds., Medicinal plants for forest conservation and health care. - Rome, FAO (Non-wood Forest Products 11). pp. 109-115.

He, S. A and Gu, Y., (1997). The challenge for the 21<sup>st</sup> Century for Chinese botanic gardens. In Conservation into the 21<sup>st</sup> Century, vol. Proc. 4<sup>th</sup> International Botanic Gardens Conservation Congress (Perth, 1995) (ed. Touchell, D. H. and Dixon, K. W.), Kings Park and Botanic Garden, Perth, Australia pp. 21-27.

Holsinger, K. E. and Gottlieb, L. D., (1991). Conservation of rare and endangered plants: principles and prospects. In Genetics and conservation of rare plants (ed. Falk, D. A. and Holsinger, K. E.),. Oxford University Press, New York, USA, and Oxford, UK. pp. 195-208.

Electronic Theses & Dissertations

ISTA, (1976). International rules for seed testing. Rules and annexes. International Seed testing Association, Seed Sci. and Technol. 4, pp. 3-117.

Jain, S.K. and DeFillipps, R.A., (1991). Medicinal plants of India Vol. 1 & 2. - Algonac, USA, Reference Publications (Medicinal Plants of the World 5).

Jayaweera, D.M.A., (1980-82). Medicinal Plants used in Ceylon, Parts 1-5. University Press, Moratuwa, Sri Lanka.

Jones, E.T., McLain, R.J. and Weigand, J., (2002). Nontimber forest products in the United States. - Lawrence, USA, University Press of Kansas. pp. 43-45.

Kuipers, S. E., (1997). Trade in medicinal plants. In Medicinal plants for forest conservation and healthcare, vol. 11. Non-Wood Forest Products (ed. G. Bodeker, K. K. S. Bhat, J. Burley and P. Vantomme), Food and Agricultural Organization of the United Nations, Rome, Italy. pp. 45-59.

Laird, S., (2002). Biodiversity and traditional knowledge: equitable partnerships in practice. Earthscan, London, UK.

\* one of

Laird, S. A., (1999). The botanical medicine industry. In The commercial use of biodiversity: access to genetic resources and benefit-sharing (ed. ten Kate, K. and Laird, S. A.), Earthscan, London, UK. pp. 78-116

Laird, S.A. and Pierce, A.R., (2002). Promoting sustainable and ethical botanicals. Strategies to improve commercial raw material sourcing. Results from the sustainable botanicals pilot project. Industry surveys, case studies and standards collection. - New York, Rainforest Alliance (www.rainforest-alliance.org/news/archives/news/news44.html, viewed 27.9.2002).

Laird, S. A. and ten Kate, K., (2002). Linking biodiversity prospecting and forest conservation. In Sellling forest environmental services (ed. Pagiola, S., Bishop, J. and Landell-Mills, N.), Earthscan, London, UK. pp. 151-172.

Lambert, J., Srivastava, J. and Vietmeyer, N., (1997). Medicinal plants. Rescuing a global heritage. - Washington DC, World Bank (World Bank Technical Paper 355).

www.lib.mrt.ac.lk

Lange, D. and Schippmann, U., (1997). Trade survey of medicinal plants in Germany. - Bonn, Germany. pp. 56-58.

Lange, D., (2000). The role of Europe and Germany within the worldwide trade in medicinal and aromatic plants. In Medicinal utilization of wild species: challenge for man and nature in the new millennium (ed. Honnef, S. and Melisch, R.), WWF Germany/TRAFFIC Europe-Germany, EXPO 2000, Hannover, Germany. pp. 48-49.

Lincoln, R.J., Boxshall, G.A. and Clark, P.F., (1982). A dictionary of ecology, evolution and systematics. Cambridge University Press, Cambridge. pp.12.

Loach, K., (1985). Rooting of cuttings in relation to the propagation medium. Pro. Int. Amer. Plant Prop. Soc. 35, pp. 472-485.

Long, J.C., (1933). The influence of rooting media on the characters of roots produced by cuttings. Pro. Amer. Soc. Hort. Sci. 29, pp. 352-355.

olu i

Mendelsohn, R. and Balick, M. J., (1995). The value of undiscovered pharmaceuticals in tropical forests. *Economic Botany* 49, pp. 223-228.

Menges, E. S., (1991). The application of minimum viable population theory to plants. In Genetics and conservation of rare plants (ed. Falk, D. A. and Holsinger, K. E.), Oxford University Press, New York, USA, and Oxford, UK. pp. 45-61

Mhasker, K.S. and Caius, J.F., (1930). A study of Indian medicinal plants. *Gymnema sylvestre* R.Br. Indian Medicinal Research Memoirs 1930; 16, pp. 2-75.

Moerman, D. E., (1998). Native North American food and medicinal plants: epistemological considerations. In Plants for food and medicine, 69-74 (ed. Prendergast, H. D. V., Etkin, N.L., Harris, D. R. and Houghton, P. J.), Proc. Joint Conference of the Society for Economic Botany and the International Society for Ethnopharmacology, London, 1-6 July 1996, Royal Botanic Gardens, Kew, UK. pp. 69-74.

Moerman, D.E., (1996). An analysis of the food plants and drug plants of native North America. Journal of Ethnopharmacology 52, pp.1-22.

Nanda, K.K. and Kochhar, V.K., (1995). Vegetative propagation of plant. Kalyani publishers, New Delhi. pp. 123-193.

Olsen, C. S., (1997). Commercial non-timber forestry in central Nepal: emerging themes and priorities (PhD thesis). Royal Veterinary and Agricultural University, Copenhagen, Denmark.

Padua, L.S. de., Bunyapraphatsara, N. and Lemmens, R.H.M.J., (1999). Medicinal and poisonous plants. Vol. 1. - Leiden, Netherlands, Backhuys (Plants Resources of South-East Asia 12/1).



Palevitch, D., (1991). Agronomy applied to medicinal plant conservation. In Akerele, O., Heywood, V. and Synge, H. eds., Conservation of medicinal plants, Cambridge, UK, University Press. pp. 168-178

Mary 17

Pant, R., (2002). Customs and conservation: cases of traditional and modern law in India and Nepal. Kalpavriksh and International Institute of Environment and Development, Puni, India. pp. 30-31.

Pei Shengji., (2001). Ethnobotanical approaches of traditional medicine studies: some experiences from Asia. Pharmaceutical Botany 39, pp. 74-79.

Pei Shengji., (2002a). A brief review of ethnobotany and its curriculum development in China. In Proceedings of a Workshop on Curriculum Development in Applied Ethnobotany, Nathiagali, 2-4 May 2002 (ed. Shinwari, Z. K., Hamilton, A. and Khan, A. A.). WWF Pakistan, Lahore, Pakistan. pp.12-13.

Pei Shengji., (2002b). Ethnobotany and modernisation of Traditional Chinese Medicine. In Paper at a Workshop on Wise Practices and Experiential Learning in the Conservation and Management of Himalayan Medicinal Plants, Kathmandu, Nepal ,15-20 December 2002, supported by the Ministry of Forest and Soil Conservation, Nepal, the WWF-Nepal Program, Medicinal and Aromatic Plants Program in Asia (MAPPA), IDRC, Canada, and the WWF-UNESCO People and Plants Initiative.

Penso, G., (1980). WHO inventory of medicinal plants used in different countries. - Geneva, Switzerland, WHO.

Schippmann, U., (2001). Medicinal plants significant trade study. German Federal Agency for Nature Conservation, Bonn, Germany, pp. 61-67.

Schippmann, U., Leaman, D. J. and Cunningham, A. B., (2002). Impact of cultivation and gathering of medicinal plants on biodiversity: global trends and issues. Inter- Department Working Group on Biology Diversity for Food and Agriculture, Food and Agricultural Organisation of the United Nations, Rome, Italy. pp.123-127.

Sheldon, J. W., Balick, M. J. and Laird, S. A., (1997). Medicinal plants: can utilization and conservation coexist? Advances in Economic Botany 12, pp. 1-104.

A 150 M 13

Shiva, V., (1996). Protecting our biological and intellectual heritage in the age of biopiracy. The Research Foundation for Science, Technology and Natural Resources Policy, New Delhi, India.

Srivastava, R., (2000). Studying the information needs of medicinal plant stakeholders in Europe. TRAFFIC Dispatches 15, pp. 5.

Subrat, N., (2002). Ayurvedic and herbal products industry: an overview. In Paper presented at a Workshop on Wise Practices and Experiential Learning in the Conservation and Management of Himalayan Medicinal Plants, Kathmandu, Nepal, 15-20 December 2002, supported by the Ministry of Forest and Soil Conservation, Nepal, the WWF Nepal Program, Medicinal and Aromatic Plants Program in Asia (MAPPA), IDRC, Canada, and the WWF-UNESCO People and Plants Initiative.

Tilt, K.M. and Bilderback, T.E., (1987). Physical properties of propagation media and their effects on rooting of three woody ornamentals. Hort. Science 22, pp. 245-247.

Toledo, V. M., (1995). New paradigms for a new ethnobotany: reflections on the case of Mexico. In Ethnobotany: evolution of a discipline (ed. Schultes, R. E. and von Reis, S.), Chapman and Hall, London, UK. pp. 75-88.

Trimen, H., (1893-1931). Handbook to the Flora of Ceylon, Dulau & Co., London.

Verlet, N. and Leclercq, G., (1999). The production of aromatic and medicinal plants in the European Union. An economic database for a development strategy. In TRAFFIC Europe, ed., Medicinal plant trade in Europe. Proceedings of the first symposium on the conservation of medicinal plants in trade in Europe, 22-23.6.1998, Kew. -, Brussels, Belgium, TRAFFIC Europe. pp. 121-126

Walter, K.S. and Gillett, H.J., (1998). IUCN Red List of threatened plants. Gland, Switzerland, IUCN.

Weaver, R.J., (1972). Plant growth substances in agriculture. Freeman and Co. San Franciscor. pp. 270-285.

WHO, IUCN and WWF, (1993). Guidelines on the conservation of medicinal plants. - Gland & Geneva, Switzerland.

WHO, (2002). Traditional medicine strategy 2002-2005. - Retrieved from WHO website, www.who.int/medicines/library/trm/trm strat eng.pdf (viewed 30.9.2002).

Williams, V. L., (1996). The Witwaterrand muti trade. Veld and Flora 82, pp. 12-14.

WWF and IUCN, (1994-1997). Centers of plant diversity: a guide and strategy for their conservation. IUCN Publications Unit, Cambridge, UK.

Xiao, P.G. and Yong, P., (1998). Ethnopharmacology and research on medicinal plants in China. In Plants for food and medicine, 31-39 (ed. Prendergast, H. D. V., Etkin, N. L., Harris, D. R. and Houghton, P. J.), Proc. Joint Conference of the Society for Economic Botany and the International Society for Ethnopharmacology, London, 1-6 July 1996, Royal Botanic Gardens, Kew, UK. pp. 31-39.

Xiao, Pei-Gen, (1991). The Chinese approach to medicinal plants. Their utilization and conservation. In Akerele, O., Heywood, V. and Synge, H. eds., Conservation of medicinal plants. -Cambridge, UK, University Press. pp. 305-313

