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Conservation and propagation of pesticidal plants: An overview

Dr Steven Belmain
Ecologist

Agriculture, Health and Environment Department
Natural Resources Institute

University of Greenwich, Central Avenue,
Chatham Maritime, Kent, ME4 4TB, UK

Tel: +44 (0) 1634 883761 | Fax: +44 (0) 1634 883379

E-mail: s.r.belmain@gre.ac.uk | Web: www.nri.org

Ethnobotanical use








About 13% of the 400,000 plant species worldwide are reported to have medicinal or pesticidal values



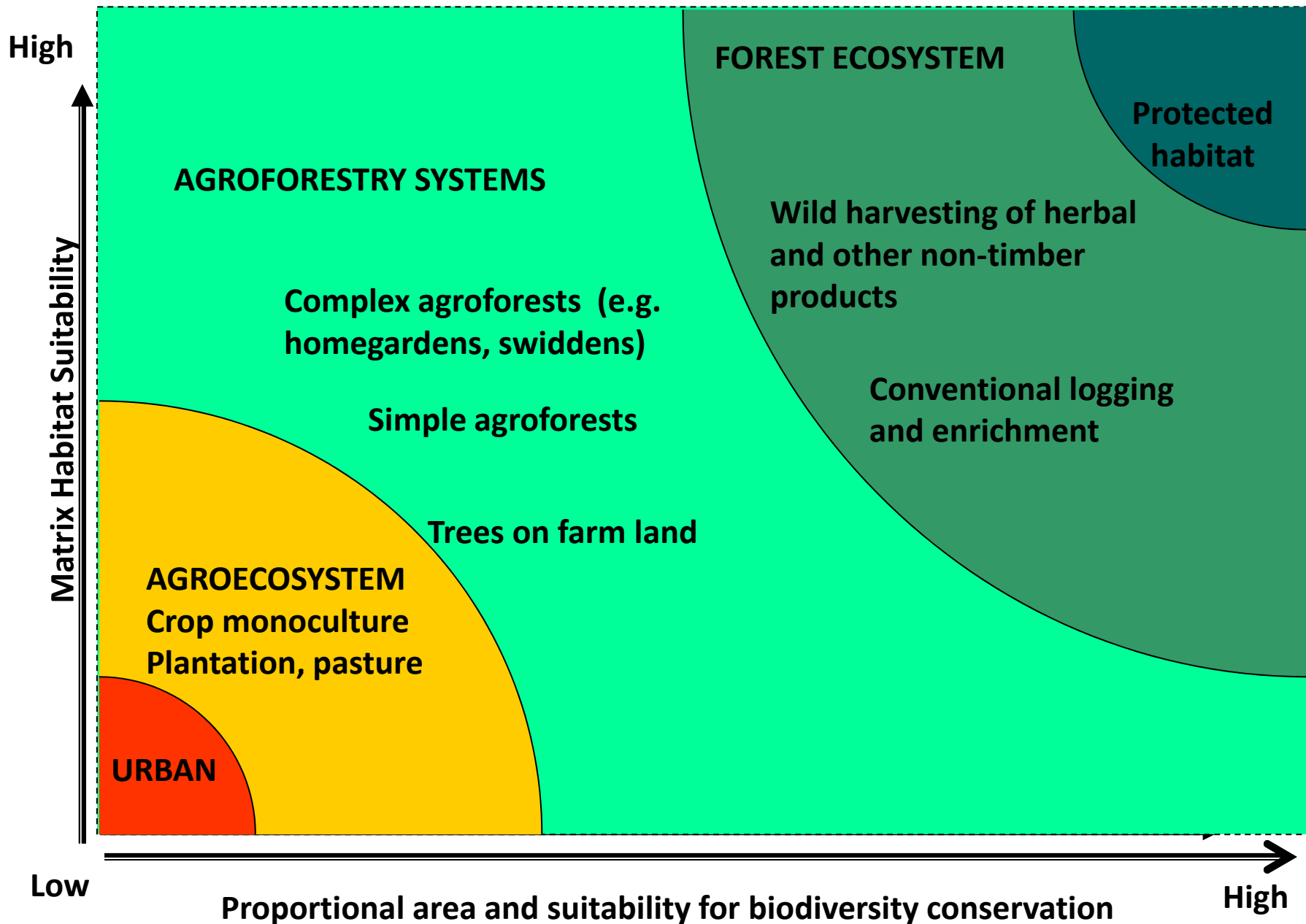
Medicinal and pesticidal plants are widely used and actively traded because herbal products are becoming accepted as viable alternatives to commercial products



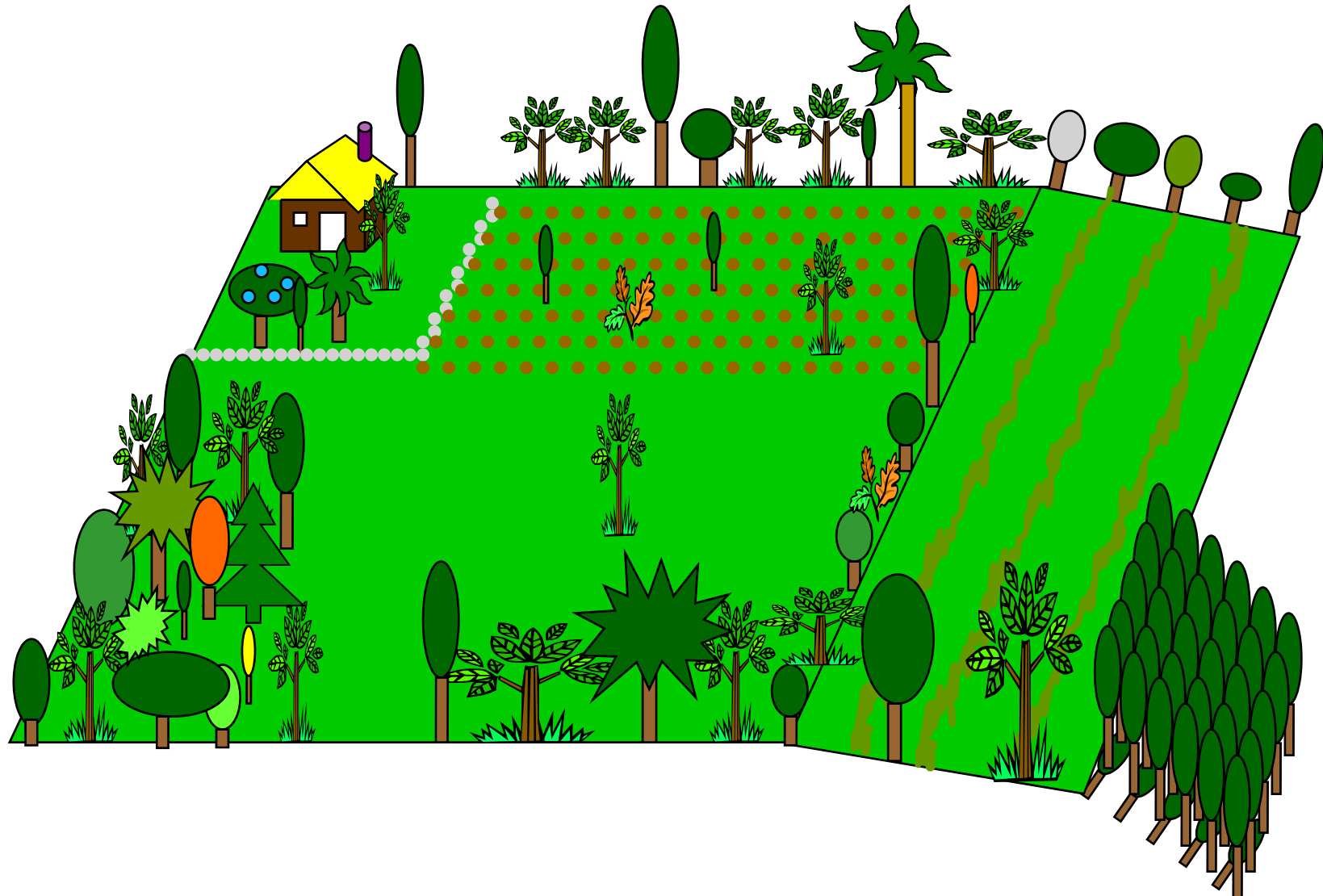
Ethnobotanical use

-  Only a few hundred species are known to be cultivated & most natural products are harvested from the wild
-  Increasing global demand drives unsustainable harvesting and overexploitation of wild plant populations
-  Documented rapid decline in abundance of some plants is compounded by overgrazing, bush fires, climate change
-  Mis-match between supply and demand of natural products suggests there is a need for cultivation to ensure regular supply as well as to conserve biodiversity
-  Agroforestry offers a potential strategy for promoting cultivation and conservation of such species

Agroforestry in the landscape matrix



Agroforestry promotes better integration and intensification of production while at the same time maintaining biodiversity on farm land



Opportunities for integration of medicinal and pesticidal plants in agroforestry systems



Planting shade tolerant species in the lower strata of multi-strata agroforests such as home gardens



Planting long-lived perennial species as shade trees, boundary markers, and on soil/water conservation structures



Cultivating short cycle species as intercrops in existing stands of plantation tree-crops



Intercropping with food crops

Do successful examples exist?

Tephrosia vogelii is cultivated widely in Africa as source of pesticidal products and fish poison. It is also used for medicine and is emetic, bactericidal, purgative and a cure for skin diseases, ringworm and parasitic infections.



Tephrosia vogelii is intercropped with maize (direct seeding). In addition to providing pesticidal products, this species improves soil fertility and used as green manure.

Prunus africana has recently come under heavy pressure for wild harvesting of its bark and timber for medicine. It has been added to Appendix II of the CITES list of endangered species for regulation of trade from wild harvested material.



Prunus africana can be easily propagated. Seedlings may be collected from wild or reproduced in a nursery from seed.

It is usually planted on farmstead borders or natural contours and can effectively replace harvesting from wild stands while providing other products and ecosystem services.

The Neem tree, *Azadirachta indica*, is planted as shade tree, windbreak, firewood and source of natural medicines, insecticides and antibacterial soaps



Basic information on many medicinal and pesticidal plants is available via databases operated by RBGKew and ICRAF – links found on ADAPPT website

Many other species may be integrated into agroforestry through development of appropriate propagation and cultivation methods

Constraints to cultivation exist for many species



Lack of basic information on ecological requirements of species



Lack of knowledge and skills in propagation, micropropagation and cultivation



Chemical variation due to strain or spatio-temporal growing conditions

Sustainable micro-propagation

Securidaca longepedunculata – African violet tree



Slow growing shrub/tree that is found across sub-Saharan Africa



Root bark is harvested, some farmers uproot entire plants



Poor germination from seed (<50% after 1 month)



Slow seedling growth



Sustainable micro-propagation

S. longepedunculata seeds sterilised and cultured on MS media (Murashige & Skoog)

Treatment time (mins)	Germination (%)
30	90
45	73
60	67

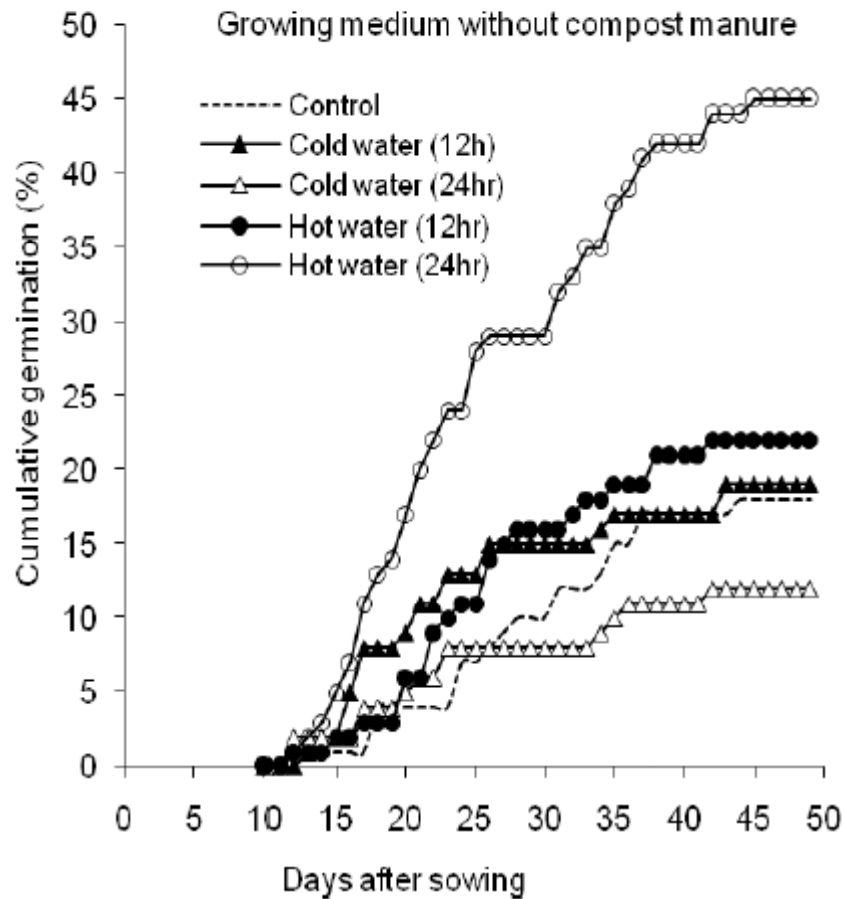
Developing method for production of roots from shoots in vermiculite. This could be adapted to place seedlings directly into soil in polybags for distribution to farmers



Zulu, D., et al (2011) *African Journal of Biotechnology*. 10(32): 5988-5992.

Sustainable propagation


Propagation studies on *Bobgunnia madagascariensis*




Thokozani, B.L.K, et al (2011) *African Journal of Biotechnology*. 10(32): 5959-5966

Sustainable propagation



 Providing propagated or micro-propagated plantlets to farmers requires careful but appropriate transfer of technology

 Potential exists for small enterprise development to meet local demand for pesticidal plants

Community-based propagation



Community nurseries, on-farm vs. communal land



World Agroforestry Centre online publications provide wealth of information, but focus has been on tree species for fruit, nut, timber, fuel, fertiliser. Less emphasis has been given in context of medicinal species, and even less on pesticidal species.



Knowledge gaps remain for domestication of many useful but slow growing, semi-arid shrubs/trees



Conservation of wild resources



Many good guides exist on sustainable harvesting, but local abuse continues due to lack of knowledge & land rights issues



No easy solutions to overcome land use conflicts in non-farm land that leads to land degradation



Is conservation outside protected areas possible?



Agricultural expansion



Peri-urban sprawl



Shared ownership and community breakdown



Poor governance



Climate change

Research and development needs



Propagation and tree management methods



Low-tech micropropagation methods



Improved harvesting and processing techniques



Germplasm collection and evaluation



Genetic improvement for desired products



Post-harvest processing and value adding



Product quality assurance



Market development



Training of cultivators and processors



Thank You