The Congress logo symbolizes the Earth composed of trees, forests, mountains, and waters in harmony, representing the Congress title "Forests for the Future: Sustaining Society and the Environment." In Oriental philosophy, the universe consists of heaven being made of yin and yang; and earth is composed of the five elements (metal, wood, water, fire and earth) in a state of flux and constant interaction. The logo illustrates the philosophy of conservation and sustainable management of the world's forests following natural law.

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Agroforestry for ecosystem services and environmental benefits. Jose, S. (*University of Florida, USA; sjose@ufl.edu*).

Modern agricultural practices have allowed for a dramatic increase in crop and livestock production; however, it has come at the expense of environmental degradation. Agroforestry, the intentional incorporation of trees, agricultural crops, and/or animals into a single land-use system, is one way to reduce the negative impacts of modern agriculture. Agroforestry systems are believed to provide a number of ecosystem services; however, until recently evidence in the agroforestry literature supporting these perceived benefits has been lacking. This poster brings together a series of papers from around the globe to address recent findings on the ecosystem services and environmental benefits provided by agroforestry. Specifically, it examines four major ecosystem services and environmental benefits provided by agroforestry: (1) carbon sequestration, (2) biodiversity conservation, (3) soil enrichment, and (4) air and water quality. Past and present evidence from both the tropical and temperate regions of the world clearly indicates that agroforestry, as part of a multifunctional working landscape, can be a viable land-use option that, in addition to alleviating poverty, offers a number of ecosystem services and environmental benefits. This realization should help promote agroforestry and its role as an integral part of a multifunctional working landscape the world over.

A two-year study of root growth of *Panax ginseng* in forests. Lee H.S., An, C.H., Kim, C.W., Bagus, I., Park, Y.G., Kang, H. J., Choi, Y.E., Yi, J.S. (*Kangwon National University, Republic of Korea; lvangood@nate.com; soaurora@naver.com; forester@nate.com; tectonagrandis@msn.com; zxcmnbv7@nate.com; gywls0406@nate.com; yechoi@kangwon.ac.kr; jasonyi@kangwon.ac.kr*).

Panax ginseng (ginseng) is an important forest product in Korea, its roots widely used as food and medicinal material. Three kinds of forest stands—oak, pine, and larch—were chosen for the comparison of root growth in ginseng. Soil pH, soil nutrients (K, Na, Ca, and Mg) and soil organic matter were analyzed using standard methods. The oak forest site was a 30-year-old stand on a SW-facing slope, with an average tree DBH, height and stem density of 21.6 cm, 14–15 m, and 1,000 trees/ha, respectively. The 35-year-old pine forest was on a NE-facing slope with an average DBH, height and density of 22.2 cm, 12–13 m and 1,100 trees/ha, respectively. The 45-year-old larch forest was on a NE-facing slope, with an average DBH, height and density of 23.1 cm, 14–15 m, and 900 trees/ha. Two-year-old ginseng roots were longest when grown under pine forest (12.23 mm), and shortest under larch (3.27 mm). Root diameters were 12.23 mm in pine, and 1.22 mm in larch. Average fresh root weights were 0.50 g in pine, and 0.17g in larch forest. High calcium ion concentration (2.27 cmol/kg) in pine forest seemed to be related with the better root growth of ginseng.

Water relations parameters of the leaves of three *Ligularia* species. Lee, K.C., Jeon, S.R., Sa, J.Y., Han, S.S. (*Kangwon National University, Republic of Korea; dlrud112@naver.com; sshan@kangwon.ac.kr*).

This study was conducted to diagnose drought-tolerance and to find an adequate cultivation environment of *Ligularia fischeri, L. stenocephala,* and *L. fischeri* var. *spiciformis* by using pressure-volume curves. The original bulk osmotic pressure at maximum turgor Ψo^{sat} was –0.8MPa in *L. fischeri* and *L. stenocephala*, This value is lower than that of –0.7MPa in *L. fischeri* var. *spiciformis*. It also appears that the osmotic pressure at incipient plasmolysis Ψo^{tp} was –0.9MPa in *L. fischeri* and *L. stenocephala*, This value is lower than that of –0.8MPa in *L. fischeri* var. *spiciformis*. Maximum bulk modulus of elasticity E_{max} was 29.0MPa *in L. fischeri* and *L. stenocephala*, which was about 2 times higher than that of 14.5MPa in *L. fischeri* var. *spiciformis*. The relative water content showed a similar value, at incipient plasmolysis RWC^{tp} was 95% in *L. fischeri*, 93% in *L. stenocephala*, and 94% in *L. fischeri* var. *spiciformis*. Therefore, the drought tolerance of *L. fischeri* and *L. stenocephala* was higher than that of *L. fischeri* var. *spiciformis*. This study showed that *Ligularia* species leaf is a low drought-tolerant with relatively high water content, and that an adequate cultivation environment is comparatively moist forest.

Contribution of indigenous agroforestry systems in biodiversity conservation and ecosystem functioning: experiences on four contrasting systems from Bangladesh. Mukul, S.A. (*Centre for Research on Land-use Sustainability, Germany; sharif_a_mukul@yahoo.com*), Saha, N. (*Shahjalal University of Science and Technology, Bangladesh, nsaha@yahoo.co.in*).

In recent years the multipurpose role of agroforestry in conservation of biodiversity and ecosystem functioning has been widely recognized, particularly in developing countries. We conducted an exploratory study on four contrasting indigenous agroforestry systems in north-eastern Bangladesh: betel-vine (*Piper betel*)-based *Khaisa* agroforestry, lemon (*Citrus limon*) horticulture-based, pineapple (*Ananas comosus*)-based *Tripura* agroforestry, and short-rotation shifting cultivation practiced by *Garo* indigenous community, to realize their biodiversity conservation and ecosystem functioning potentials. The functional diversity of plants, planted-wild crop ratio, cultural management, conservation values, and ecosystem benefits of each agroforestry system were evaluated through a series of systematic survey and standard procedures. The study revealed that betel-vine-based agroforestry is the most environmentally and ecologically feasible land-use system in the area supporting higher plant and wildlife diversity and providing greater ecosystem benefits, which sometimes seem even better than the indigenous forest cover. Intensification of management practices and extensive use of agro-chemical for higher yield in few of these agroforestry systems, however, threatens local ecosystems. The study concluded that for scientific improvement, greater recognition, and wider application of a few of these indigenous agroforestry systems will certainly bring positive outcomes for sustainable land-use in the country.

Neem-based agroforestry system for enhancing the productivity of drylands. Muthusamy Palani D., Natesan C.S. (*Forest College and Research Institute Mettupalayam, India; divsara05@yahoo.com; rasincs@yahoo.co.in*), Henry P. (*TNAU, India; philip.tnau@gmail.com*).

In India, the productivity of drylands is getting reduced by erratic and uncertain rainfall. The adoption of a neem-based agroforestry system is a viable option for increasing the productivity of drylands because neem is a best suited tree for drylands. The versatility of this tree is that it survives in very extreme climates and grows in a variety of soil types. In India, neem trees are found growing scattered in the fields surrounded by crops that appear to be quite unaffected and also on the boundaries of the fields to meet local demands for timber, fodder, and fuel. Results of the compatibility study revealed that there was least reduction in growth and yield of intercrops due to effect of neem trees. Among intercrops raised, cowpea and horsegram were found to be highly compatible and more beneficial in boosting the growth of neem trees. The neem-based agroforestry system