A reinvention of agriculture is needed to meet global challenges

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Des Moines, Iowa USA: World renowned scientists speaking at the World Food Prize Borlaug Dialogue have called for a radical transformation in the agriculture sector to cope with climate change, food security and to transition towards sustainability.

Dr Dennis Garrity, Director General of the World Agroforestry Centre and Professor MS Swaminathan, 1987 World Food Prize Laureate and founder of the MS Swaminathan Research Foundation, have teamed up to promote what they call a 'fresh out of the box solution' which is already dramatically improving crop yields while storing significant carbon.

"Doubling food production by mid-century when so many of the world's soils are depleted and we are faced with a changing climate cannot be achieved with business-as-usual conventional agriculture," Garrity said. "We need to reinvent agriculture in a sustainable and affordable way so that it can adapt to climate change and reduce its emissions of greenhouse gases."

Swaminathan added that "novel solutions and technological advances must be married with ecological thinking to drive a truly sustainable agricultural revolution".

The concept of Evergreen Agriculture, where fertilizer trees are integrated into annual food crop and livestock systems, sustains a green cover on the land throughout the year. It bolsters nutrient supply through

nitrogen fixation and nutrient cycling, increases direct production of food, fodder, fuel, and fibre, and provides additional income to farmers from tree products.

In a recent article in the Journal of Food Security, Garrity and co-authors highlight how evergreen agriculture has already provided benefits to hundreds of thousands of farmers in Zambia, Malawi, Niger and Burkina Faso. These farmers are seeing the results of fertilizer trees that draw nitrogen from the air and transfer it to the soil through their roots and leaf litter. Exhausted soils are being successfully restored with richer sources of organic nutrients, and crop yields and incomes are on the rise.

Farmers in Malawi have increased their maize yields by up to 280% when the crop is grown under a canopy of one particular fertilizer tree, Faidherbia albida. Unlike most other trees, Faidherbia sheds its leaves during the early rainy season and remains dormant through the crop-growing period, making it highly compatible with food crops.

In Niger, there are now more than 4.8 million hectares of millet and sorghum being grown in agroforests that have up to 160 Faidherbia trees on each hectare.

Such trees greatly enhance carbon storage both above and below ground compared to conventional agriculture. While estimates of the carbon sequestration potential of agroforestry systems vary greatly - from under 100 Mt CO2e per year to over 2000 Mt CO2e per year over a 30 year period – the IPCC recognizes that the 'transformation of degraded agricultural lands to agroforestry has far greater potential to sequester carbon than any other managed land use change'.

A broad alliance is now emerging of governments, research institutions, and international and local development partners committed to expanding evergreen agriculture. IFAD, the EU, AGRA, the Gates

Foundation and UNEP are among those interested in developing partnerships to move the evergreen agriculture agenda forward.

"We are already working with 18 countries across the African continent to develop national plans for implementation of evergreen agriculture," Garrity explained.

The next step is to further refine and adapt the technologies to a wider range of smallholder farming systems in diverse agricultural environments, so that millions of other farmers can benefit for many years, and for generations to come, from such sustainable solutions to their food production challenges.

Swaminathan emphasized the particular need of Africa for an evergreen revolution that increases productivity in perpetuity without causing ecological damage.

"Successful examples of evergreen agriculture from Africa urgently need further research and scaling up to create a real evergreen revolution," Swaminathan said.

"Evergreen agriculture allows us to glimpse a future of more environmentally sound farming where much of our annual food crop production occurs under a full canopy of trees," says Garrity.

Provided by World Agroforestry Centre