Division 1 Silviculture,
Agroforestry Research Group (1.04.00)

Online Conference

26-27 July 2023

Agroforestry systems in the world: differences and similarities

Abstract Book

Preface

Agroforestry is a land use system that integrates forest crops, agriculture crops, livestock including Medicinal and Aromatic plants in a given space and time. This practices can provide a sound ecological basis for increased crop and animal productivity, more dependable economic returns, and conserving biodiversity. It an important role in providing livelihood security and buffering households against climate related risks. This practice is increasingly becoming attractive in almost all Asian countries and in the World. It has been estimated that about 1.2 billion people, particularly in developing countries, depends on agroforestry farming systems for their livelihood.
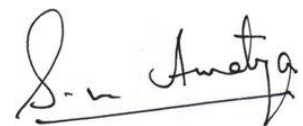
This Agroforestry Research Group is involved in promoting agroforestry program/ activities through organizing and participating various fora. It has organized and participated various International Workshops, International events related with forests and forestry related with agroforestry discipline. The present online conference, held for two days (26-27 July 2023) is the continuation of its activities. Its goals are to analyse and discuss the concepts, productions and their ranking, the species and the stand structure, the management options, the modelling and the practice of agroforestry systems. This online conference has expected to get some answer in the following issues.

- Are agroforestry systems adapted to climate variability (and/or climate change)?
- How can integration and ranking of the multiple productions in agroforestry systems can be achieved and maintained?
- Do species and site contribute to the diversity of agroforestry systems?
- Are management options and practice similar or different from the timber oriented forest systems?

This book of abstract has been prepared as a reference knowledge product for all those who had attended the online conference and for others interested in this discipline.

It is very encouraging to have more than 350 registrations and 70 participants in this event all over the World. Because of the disruption of internet some of our participants couldn't attend and present the abstract.

It was also very encouraging to all of us that IUFRO President Dr. John A. Parrotta has delivered his welcome remark and has attended the two days' online conference despite his busy schedule. I would like to keep on record sincere appreciation to Dr. Jens Peter, IUFRO Divison1 Coordinator for his constant support, to Dr. Ana Cristina Gonçalves and Dr. Sanjeev Chauhan, both Deputy coordinators of IUFRO Agroforestry Research Group, for their tireless effort for the success of this conference.

Swoyambhu Man Amatya
Coordinator, IUFRO Agroforestry Research Group (1.04.00)
28 July 2023

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Presentations

Study of Silviculture practices in Jhum sites in Nagaland Forest Management Project (NFMP): Their socio-economic and cultural rationale and biodiversity and ecosystem impact vis-à-vis Forestry Models in New Riphyim Village, Wokha Nagaland

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Abstract

A comparative study was carried out in three sites in New Riphyim Village,Wokha: Active jhum (Site I with 7 years fallow); after jhum (Site II with 2 years fallow) and Forestry Intervention Model (Site III, 3 years old plantation).A total of nine (9) quadrats were randomly laid at 30m×30m for trees, 5m×5m for shrubs and 1m×1m for herbs. For biodiversity assessment a total of 48 tree species belonging to 24 families was assessed. *Schima wallichi (IVI=266.19), Macaranga denticulata (IVI=90.53), Syzgium cumini (IVI=43.34) and Machilus zuiohoensis (IVI=41.73)* were the most important tree species. Highest density among tree species was found to be *Schima wallichi* (20034.6 trees ha^{-1}) followed by *Macaranga denticulata* (6478.29 trees ha^{-1}). Among the diversity indices site III represent highest Shannon diversity (3.06) and Margalef species richness (5.74), while maximum Simpson dominance was in site I (0.22). In addition, maximum biomass and carbon stock of standing trees was found in site I (4.7 and 2.28Mg ha^{-1} respectively). The fallow age was found to have contributed the most to the recovery of carbon from living woody biomass. A gradual increase in the diversity of woody species along the fallow age evinces the potential of longer fallow forests to enhance carbon stock. Further, the results would help in formulating appropriate policy interventions on conservation strategies and developing climate change mitigation policies for efficient preservation of forest. The present study carried out in the above mentioned models in Nagaland is the first of its kind and hence no comparative study has been undertaken and that the results obtained from the study can be used as a future reference for such work in the same field. Forestry Intervention Models under NFMP is a good initiative as it is not only a positive step taken towards environmental upgradation through rehabilitation of tree cover in Jhum areas but also provides community based participation and income through various activities taken under the project.

Keywords: Shifting cultivation, Jhum Agroforestry, Forestry Intervention Models, Silviculture, Fallow management.

Does rehabilitation of degraded lands through fruit-based systems enhance the net Greenhouse gas mitigation?

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Abstract

Rehabilitation of degraded lands in India is becoming a part of the solution to achieve the targets of enhancing carbon sequestration of 1 billion to 2.3 billion carbon dioxide equivalents by 2030. To address this, rehabilitation of degraded lands through fruit planting with appropriate technologies could enhance carbon stock and reduces the GHG budget under changing climate scenarios. Therefore, a study was carried out at ICAR-NIASM, Baramati to assess biomass, carbon sequestration potential and net greenhouse gas emission from mango, coconut and pomegranate orchards established in degraded lands. Randomly selected fruit trees were destructively harvested, separated biomass components, sorted, sampled, weighed and dried for biomass component-wise. The highest total carbon stock was recorded in mango (30.18 Mg C ha^{-1}) followed by pomegranate (9.60 Mg C ha^{-1}) and coconut (7.92 Mg C ha^{-1}). However, a higher carbon sequestration rate (tree+soil) was also reported in mango (11.42 Mg C ha^{-1} yr^{-1}) followed by coconut (8.07 Mg C ha^{-1} yr^{-1}) and pomegranate (8.05 Mg C ha^{-1} yr^{-1}). For net greenhouse gas emissions, the summation of all the inputs and outputs was represented as total carbon input and output. Among various inputs, fuel was a major contributor to GHG emissions in mango and coconut with 53% and 45 % respectively but in pomegranate fertilizer application (34%). Mango cultivation on degraded lands emitted about 31.88 Mg CO_2 eq. ha^{-1} greenhouse gas emissions followed by pomegranate cultivation (26.22 Mg CO_2 eq. ha^{-1}), and coconut cultivation (3.84 Mg CO_2 eq. ha^{-1}). The net CO_2 mitigation potential was maximum in mango orchard (164.25 Mg CO_2-eq ha^{-1}) followed by pomegranate orchard (101.34 Mg CO_2-eq ha^{-1}) and coconut orchard (68.59 Mg CO_2-eq ha^{-1}). The results stated that rehabilitation through fruit systems enhances the net carbon in the systems.

Keywords: GHG budgeting, degraded lands, carbon sequestration and Climate change

Intercropping of Ashwagandha (*Withania somnifera* L. Dunal) under Mandarin and Kinnow based Agroforestry Systems in Jhalawar Region

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Abstract

A field experiment was conducted during the September 2018 to April 2019 to study **"**Intercropping of Ashwagandha (*Withania somnifera* L. Dunal) under Mandarin and Kinnow based AgroforestrySystems in Jhalawar Region**"** at the Instructional farm, Fruit Science, College of Horticulture and Forestry, Jhalawar, Agricultural University, Kota (Rajasthan). Seven years old plantations of mandarin (*Citrus reticulata* Blanco.) and Kinnow (*Citrus nobilis* Lour. × *Citrus deliciosa* Tan.) at 6 x 6m spacing were used for intercropping of four varieties of Ashwagandha as an intercrop viz. 'JA-20-, JA-134, RVA-100 and AA-1' planted at 60x60 cm were selected for the present study. The analysis of variance showed significant differences among Intercropping of Ashwagandha under Mandarin and Kinnow based Agroforestry system as well as sole cropping for all the growth and yield parameters of Ashwagandha. Significant maximum plant heights, collar diameter and number of branches at different interval as 30 DAS, 60 DAS, 90 DAS, 120 DAS, 150 DAS and harvesting time were recorded in the T_{10} (Ashwagandha var. JA-20 Sole). The maximum root length, root diameter, total number of roots per plants of Ashwagandha were found in T_{11} (Ashwagandha var. JA-134 Sole) followed by T_{10} (Ashwagandha var. JA-20 Sole) were also Significant. The maximum root yield (fresh and dry), and seed yield was found in the treatment T_{11} (Ashwagandha var. JA-134 Sole) was also significant. Highest vegetative growth and reproductive growth was found in T_{10} (Ashwagandha var. JA-20 Sole) followed by T_{11} (Ashwagandha var. JA-134 Sole). The growth and yield parameters of Ashwagandha plant under sole cropping system were higher than Mandarin and Kinnow based agroforestry system. JA-134 and JA-20 variety of Ashwagandha performed better among all four varieties of the ashwagandha intercropped under Mandarin based Agroforestry system as well as sole. Therefore, these two varieties of Ashwagandha can be grown preferably as an intercrop with the spacing of 60x60 cm. among four varieties under Mandarin Orchard.

Keywords: Ashwagandha, vegetative growth, yield, Mandarin, agroforestry

Factors, relationships and dynamics of silvopastoralism in the Mediterranean: the shared understanding of stakeholders

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Abstract

Silvopastoral systems combine animal production and woody perennials, supporting rich biodiversity and providing important ecosystem services. These agroforestry systems produce food and raw materials, regulate the water cycle, prevent wildfires, and maintain cultural and recreational landscapes. Despite their recognized potential for balancing sustainable production, biodiversity conservation, and climate change mitigation and adaptation, silvopastoral systems are declining in Mediterranean mid-mountain areas. Addressing their continuity requires considering socioeconomic, environmental, and institutional factors and engaging multiple stakeholders. This study investigated the shared understanding of stakeholders on the factors that drive silvopastoralism in two Mediterranean case studies of northeastern Spain: Sierra de Guara Natural Park (Aragon) and Lluçanés region (Catalonia). We combined semi-structured interviews with researchers and participatory workshops with livestock farmers, forest owners, technicians, local authorities, and environmentalists to build a Fuzzy Cognitive Map (FCM) for each study case. FCMs were formed by key factors influencing silvopastoralism connected with directed and weighted arrows reflecting the relationships among them. The FCMs were transferred into adjacency matrices and iteratively multiplied by a state vector of the factors to model the current situation of the systems. Results confirm that the decline of silvopastoralism in the Mediterranean is leading to an increase in wildfire risk. While the socio-economic attractiveness of livestock farming was an important factor influencing this situation in both cases, other factors such as farm abandonment in Guara and access to land in Lluçanès were site-specific. Climate change and the Common Agricultural Policy were the main external drivers negatively affecting silvopastoralism whereas technological innovations could enhance this activity. Although targeted interventions aimed at improving the attractiveness of the sector by increasing its economic viability or overcoming structural deficiencies such as lack of fences or water points could promote transformative change, a policy shift towards supporting silvopastoralism would further enhance the delivery of ecosystem services.

Keywords: Fuzzy cognitive maps, Participation, Forest grazing, Ecosystem services, Wildfires

New methodologies to study the influence of oak crown cover in the Montado, a traditional agroforestry system of the Iberian Peninsula

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Abstract

The *Montado* is a traditional High Nature Value Farming (HNV) agroforestry system of the South of the Iberian Peninsula. The Montado is characterized by the presence of long-lived oak trees (mainly *Quercus suber* and *Quercus ilex*) and pastureland. The importance of *Montado* sustainability during a climate change scenario should be updated considering the benefits these HNV systems bring to societies. In a *Montado*, multiple ecological interactions are intertwined in the landscape (such as forest, pasture, soil, wildlife, and cattle). Signs of the decline of the *Montado* crown cover have been reported. Managing a complex, high-longevity agroforestry system as the *Montado* requires a sound knowledge that integrates forest management with agriculture in a landscape with various degrees of oak crown cover.

This research followed an integrative approach to investigate how crown cover influences natural regeneration, soil conditions, and litter layer in pure holm oak agroforestry systems. The results showed that a higher crown cover was linked to a higher number of established natural regeneration, and a tendency for higher values of soil organic carbon and litter layer. Furthermore, it was possible to observe a positive correlation between natural regeneration, litter layer, and soil organic carbon together with a negative correlation with soil pH. This study brings a positive perspective on the preservation of *Montado* holm oak stands.

Keywords: *montado*, agroforestry systems, organic carbon, natural regeneration, Mediterranean.

Assessing food crop production in smallholder agroforestry systems in the Bamenda Highlands of Cameroon: Perspectives of smallholder agroforestry practitioners

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Abstract

Smallholder agroforestry systems contribute enormously to food supply in Cameroon in general and the Bamenda Highlands in particular. However, several challenges including climate change, institutional and market failures, aging farmers and rural exodus threaten the survival of smallholder agroforestry systems, which in essence threatens food security. Using a mixed methods approach made up of household surveys, key/expert informant interviews and direct field observations, this study examines the factors influencing food crop productivity in smallholder agroforestry systems and the implications on food security in the Bamenda Highlands of Cameroon. Findings show that the main smallholder agroforestry systems in the Bamenda highlands are agrisilvicultural and agrisilvipastoral. Food crops cultivated within these systems are maize, cassava, beans, cocoyams, potato, sweet potato, yams, vegetables, groundnuts, pumpkin and plantains. The main factors influencing food crop productivity in smallholder agroforestry systems are climate elements (rainfall, temperature, sunshine, and winds), access to farm inputs, access to land, household income, gender and age of the farmer. Overall, smallholder agroforestry systems contribute towards ensuring food security in the Bamenda highlands. Policy makers are therefore called upon to take adequate measures geared towards ensuring the sustainability of smallholder agroforestry systems in order to ensure food security in the Bamenda Highlands in particular and Cameroon in general.

Reducing wildfire fuel loads with Silvopasture

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Abstract

Fire is an ecosystem disturbance that has an essential role in the health and integrity of the western forests of the United States. However historic forest management, unregulated grazing, and fire suppression has altered the composition and structure of these forests. Coupled with climate change, forest fires have now altered from historic disturbance regimes, resulting in high intensity and high severity fires. Silvopasture, defined as the intentional integration and management of trees, livestock, and forage on the same unit of land has been assessed as an effective land management system to reduce wildfires in Mediterranean Countries. Fuelled by a lack of regionally specific research, I examined the potential of silvopasture as a method of reducing both fine and woody fuels in coniferous forests. This research project compared silvopasture to other common types of grazing and forest management. Among all land management types, silvopasture and continuously grazed sites had the lowest amounts of fine and woody fuel loads. However, silvopasture sites had the greatest temporal reduction of fine fuels (grasses, forbs) that corresponded to fire season. Taken together, the reduction of fuels and timing of the reduction suggests that silvopasture is an effective method managing for wildlife.

Keywords: silvopasture, fire, agroforestry

Agroforestry Research in the US to Inform Use of Climate-Smart Practices and Programs

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Abstract

The US is seeing enhanced producer interest in agroforestry with new and expanded government programs to support the uptake of climate-smart practices. With these programs, the US Department of Agriculture is working to better quantify agroforestry carbon stocks and carbon sequestration potential and to identify high-value landscape and community opportunities for agroforestry. Research is focusing on production of high-definition trees outside of forest maps, producer surveys to better inventory specific agroforestry practices, and synthesis of agroforestry ecosystem services research at scales that can engage producers and communities and support activation of cost-share programs. Partnerships are also being used to support development of innovative carbon quantification methods and demonstration sites. As costs are a concern for many US producers shifting practices, budget tools can also prove useful.

Keywords: climate, carbon, ecosystem services, management

Fruit trees-spices-vegetables agroforestry for increasing production and maximizing land use

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Abstract

The food and nutrition securities in Bangladesh are supposed to be jeopardized by on-going climatic threats, cultivable land scarcity and population pressure. To overcome these problems, sustainable agricultural practices like fruit tree-based agroforestry system can play a vital role. In this study, malta, guava and jujube tree orchards were converted into agroforestry systems through the inclusion of seasonal vegetables (okra, Indian spinach, bitter gourd, cucumber, broccoli and bottle gourd) and spices (ginger and turmeric) with a view to identifying suitable crops for fruit tree-based agroforestry system in terms of productivity, profitability and land use. Distances from tree bases were considered as treatments for each crop, while performances of fruit trees were compared between agroforestry and non-agroforestry. Results revealed that crop yields were increased with the increase of distances from the tree bases and the yields were reduced slightly in 2nd year than the 1st year. The overall crop yield in the agroforestry system was higher compared to control. In that agroforestry system, only 18% of land was used for spices (ginger and turmeric), which ultimately boost the total productivity as well as maximize land utilization. Interestingly, by utilizing the additional inputs given for associated crops, the yields of the fruit trees were augmented. Crops were grown in the early stage of the fruit orchards where the interruption of light intensity was minimum on the associated crops and the availability was almost identical to open field. In jujube-based agroforestry system, light was almost identical to open field. The utmost BCR and LER obtained in agroforestry system clearly indicated the maximum seasonal returns. In brief, fruit tree-based agroforestry system can be a promising alternative to provide higher economic benefits, boosting food and nutritional security, improving soil nutrient status and utilization of land.

Impact of multipurpose tree species (MPT's) on soil and socio-economic status of farming community of sub-temperate region of Himachal Pradesh

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Abstract

The current study was administered for MPT's (multipurpose tree species) *Albizzia lebbeck*, *Bauhinia variegata*, *Celtis australis*, *Grewia optiva* and *Quercus leucotrichophora* at Haripur Dhar, Nauni, Rajgarh, Sarahan and laboratory of the Department of Silviculture and Agroforestry, Dr. Y. S. Parmar University of Horticulture and Forestry, Nauni, Solan (H.P.) in the course of 2021 to 2022 under the broad heads *viz.,* to study the impact of multipurpose tree species on physical and chemical properties of soil, estimation of biomass and to study the impact of multipurpose tree species on socio-economic status of farming community. Samples were brought to laboratory for completion of every single objective except socio-economic survey (done through multistage sampling), bulk density and biomass estimation of MPT's, as they were accomplished exclusively through assemblage of field data at best. Soil physical and chemical properties were found to be comparatively better under *Grewia optiva* and *Celtis australis.* The results from the current study indicated that on farmer's field, *Grewia optiva* and *Quercus leucotrichophora* were the most dominant multipurpose tree species with highest biomass accumulation. Farmers preferred *Grewia optiva* for fodder the most, followed by *Quercus leucotrichophora.* The effect of multipurpose tree species was evident on farmer's daily needs. Ban oak was the leading species among MPT's in reducing farmer's monetary expenses regarding daily farm needs. On an overall basis, *Quercus leucotrichophora* was the most preferred species by farmers for meeting their domestic as well as on farm needs. The study concluded that MPT's has immense influence on the socio-economic status of farming community by knowing the diverse uses to which farmer is utilizing these majestic tree species in their niche.

Keywords: Multipurpose tree species, Socio-economic, Fodder, Biomass

Farm boundary planted Sesbania sesban improves soil fertility and teff yield in the semi-arid areas of Northern Ethiopia

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Abstract

Poor soil fertility is a major constraint to agricultural production in the semi-arid areas of northern Ethiopia. As a consequence, the nitrogen fixing *Sesbania* [*Sesbania sesban* (L.) Merr.] tree was introduced to improve the declining soil fertility and for other uses. In recent years, however, the farm boundary planted *Sesbania sesban* has been cut without replacement as the farmers are not aware of its contribution to soil fertility. Hence, a field trial with the objective of evaluating the contribution of *Sesbania* to soil fertility and teff (*Eragrostis tef*) yield was conducted. The trial comprises five distances (0.5m, 1.5m, 2.5m, 3.5m and 10m) and two depths (0 – 15 cm to represent to soil and 15 – 30 cm to represent subsoil) from twelve farms in two localities (Medebay Zana district and Tahtay Maichew district). Each farm was considered as a replication. Results revealed, a significant ($P < 0.5$) decrease in CEC, K, Ca + Mg, Ca with increasing distance from the tree line of *Sesbania* was found in both Medebay Zana and Tahtay Maichew districts. In Medebay Zana, available P, K, Ca + Mg showed a significant ($P < 0.5$) decrease with increasing soil depth while in Tahtay Maichew, OC, CEC, K and Ca showed a significant decrease with increasing soil depth. Soils in Tahtay Maichew were high in Ca and Ca + Mg while soils in Medebay Zana were high in K. Up to 31.63% increase in yield of teff was recorded in areas close to the tree line as compared to the 10 m control and in Tahtay Maichew (34.12%) as compared to Medebay Zana. As a result, farm boundary planted *Sesbania* have excellent potential to improve soil fertility and increase yields. In light of this, our extension system should promote the planting and retention of Sesbania.

Keywords: Agroforestry, organic C, soil properties, Sesbania, tree line

Impacts of environmental variability, forest degradation, and forest management on the biomass, carbon stock, and CO_2 sequestration potentials of natural forests in Northwestern Ethiopia

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Abstract

As a climate change adaptation and mitigation strategy, natural forests are crucial in maintaining ecosystem stability and the carbon cycle. Yet, there are issues with deforestation and forest resource degradation. In order to mitigate and adapt to climate change, urgent intervention management is needed along with an instant evaluation of the potential of the current carbon store specific to environmental variability, degradation levels, and forest management interventions. Based on the area covered, an investigation was conducted on nine specifically chosen forest communities in various agroecology. Using R Ver. 4.1, data on diameter, height, and environmental patterns at different degradation levels and forest management approaches were gathered and examined. The outcome showed that there was a significant difference ($p < 0.029$) between environmental variabilities and the overall pool of carbon stock among forest communities. A higher overall carbon pool was found in highland forests (778.25-ton ha^{-1}), gentle slope gradients (1019.5-ton ha^{-1}), lower elevation gradients (614.5-ton ha^{-1}), and southwest-facing forests (800.1-ton ha^{-1}). Soil organic carbon was higher in lowland forests (153.6-ton ha^{-1}). The largest carbon stock was achieved by forest enclosure management (993.2-ton ha-1), whereas the lowest carbon stock (283.1-ton ha^{-1}) was achieved in forests under heavy anthropogenic strain. According to the study findings, the natural forest in the study area has a sizable amount of carbon stock and has a large potential for sequestering carbon dioxide which is crucial for mitigating and adapting to climate change. However, forest deterioration primarily brought by anthropogenic factors reduces the value of the forest, whereas forest management measures, such as area enclosure increase the forest's capacity to store carbon.

Keywords: Carbon stock, environmental conditions, natural forest, forest degradation, forest management

First record of Bagworm, *Chaliopsis junodi* (*Lepidoptera*: *Psychidae*) on *Acacia mearnsii* De Wild in plantation sites in Awi zone, Ethiopia

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Abstract

The Black wattle tree, *Acacia mearnsii* is native to Australia. It is one of the most promising species that can be chosen for the degraded rehabilitation and soil conservation and is the chief source of charcoal production in Awi Zone, Ethiopia. It has great economic, ecological and social values for Ethiopians. However, the production of charcoal and plantations decreases from time to time due to many factors, including invasive insect pest and disease attacks, but no information was available about the identity and importance of leave defoliators damaging this tree. The bagworm family (*Lepidoptera*: *Psychidae*) includes approximately1000 species, all of which complete larval development within a self-enclosing bag. Field research done in the area of Awi Zone, Ethiopia, in December 2021 lead to the discovery of bagworms (*Lepidoptera*: *Psychidae*) as a pest of *A. mearnsii* plantation forests for the first time. Field observations strongly suggest that collecting of the larvae by handpicking to burning in burrow (cultural control) is a crucial method to prevent the tree.

Keywords: *Acacia mearnsii*, Awi Zone, bagworm, defoliator, handpicking

Evidence-based resources for selecting agroforestry plant materials in the United States

Gary Bentrup

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Abstract

The US Department of Agriculture, National Agroforestry Center is developing evidence-based resources to assist producers in selecting tree and shrub species to provide multiple purposes in their agroforestry practice. One resource is an interactive web-based tool entitled *Tree Advisor* that rates woody species for a wide range of different purposes based on plant attributes. In this prototype decision support tool, 90 species of trees and shrubs are rated for 14 different purposes in the northern and central Great Plains region of the United States. A rating algorithm was developed based on the scientific literature regarding plant functions and related plant attributes that determine relative performance of a species for each purpose. Higher-rated species will likely function better than other species for specific purposes due to their traits. Feedback from producers indicates this tool supports decision-making and may serve as a template for developing woody plant selection tools for other US regions. Another resource being developed is the *Agroforestry Guidebook for Selecting Tree and Shrub Species in the US* which is a comprehensive, national publication to assist producers in selecting plant species for five common agroforestry practices in the US (i.e., silvopasture, windbreaks, riparian forest buffers, alley cropping, and forest farming). In addition to practice-based chapters, chapters on plant considerations for Indigenous agroforestry and urban agroforestry are being prepared. The Guidebook also includes over 90 individual species profiles that provide detailed information on site preferences, plant characteristics, pests and diseases, wildlife value, agroforestry products and uses, historical and cultural uses, propagation and regeneration, and agroforestry-specific management considerations. This Guidebook will be available in 2024.

Keywords: plant selection; multifunctional, decision support tool; ecosystem services; plant traits

LIFE AgroForAdapt project: promoting Mediterranean agroforestry as a tool for climate change adaptation

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Abstract

LIFE AgroForAdapt is a 5-years (10/2021-09/2026) EU-funded project aiming to promote agroforestry systems as a tool for climate change adaptation of Mediterranean landscapes. The main trait of this project is its geographical scope, with 76 demonstrative systems (totalling more than 850 ha of either new or pre-existing systems) in Spain (Catalonia and Castilla y León) and France (Occitanie and PACA). These systems include several modalities of silvoarable (alley cropping, hedgerows, field splitting) and silvopastoral (grassland silvopastoralism, forest silvopastoralism) agroforestry, with multiple crops, livestock species and trees or forest types represented. The 8 project beneficiaries work together to: (i) assess the performance of the demonstrative systems on several socio-economic and climate change related ecosystem services including vulnerability to drought and forest fires, microclimate, carbon balance and biodiversity; (ii) develop and apply at pilot scale new tools to facilitate the planning, design and prioritization of areas where to install agroforestry systems and for agroforestry products marketing; (iii) analyse and propose improvements to the policy and regulatory framework affecting Mediterranean agroforestry; (iv) raise awareness on the interest and multifunctionality of agroforestry among society in general and among the agricultural, livestock and forestry sectors in particular. At the present stage of development of the project (summer 2023) we have accomplished the first monitoring campaign and are focused on conducting a study of the policies and regulations affecting agroforestry (in collaboration with other EU projects and initiatives) and on promoting the networking within agroforestry communities (farmers, consultants, researchers) in Spain and France.
The project web page is: https://agroforadapt.eu/

Keywords: climate change, policy, silvoarable, silvopastoral

Agroforestry in the Adaptation Strategies of EU Member States - Omissions and Opportunities

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Abstract

The EU has a "Strategy on Adaptation to Climate Change", written in 2021, and a Climate Law which aims for neutrality in 2050, together with a revised LULUCF Regulation which places large demands on Member States to increase carbon sequestration in forests, and other land, to the level of -310 MtCO2e yr^{-1} in 2030. All Member States are in the process of updating their national Adaptation Strategies and Adaptation Plans, and these are held on a EU Portal. Some countries have made several references to the role of agroforestry; others have ignored it completely. Those which fail to mention agroforestry are mainly countries which have not provided options for the establishment or restoration of agroforestry in their Common Agricultural Policy Strategic Plans, or in their Forestry Strategies. This presentation will analyse the extent to which Member States recognise the role of agroforestry in climate adaptation - and areas where it could have been mentioned. Particular focus will be on the advantages of agroforestry in a) crop temperature moderation; b) animal welfare and protection from extremes; c) hydrology of droughts, floods and catchments; d) wind and water erosion; e) mitigation of storm damage; f) moderation of wildfires; g) management of tree diseases; h) increasing species choice; i) creation of multiple revenue streams - including bioenergy; j) improvement of habitat and landscape diversity. Options to improve the recognition of agroforestry within climate mitigation and adaptation strategies at a national level are considered.

Socio-economic and environmental sustainability of agroforestry system

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Abstract

Agroforestry has very long tradition in the past days, currently it is found in every part of the world. Agroforestry system provide an important explanation in which sustainability, regulatory, habitat, provisional and other environmental factors is being exploited. The system helps in nitrogen fixation and the droppings decay adding soil nutrients hence boost the soil fertility which have the positive impact on crop production boosting food security. Agroforestry support livestock production through provision of fodder especially during the dry spell when the animal feeds are inadequate. Moreover, home gardening and multi-storey system provide various vegetables, crops produce and fruits at the same time and is effective when the land is limited. The system assist in the carbon fixation and regulation of greenhouse gases emission in the ecosystem hence is viewed as one of the methods of addressing global climate change challenges. The agroforestry aid in prevention of soil erosion, diversify the landscaping with trees, sustainability in land use management, biological control of pests, diseases, weeds and habitat of many living organisms indicate how the important it is in terms of biodiversity. The ability of this system to maximize various socioeconomic returns and it provides the fiber, timber, non-timber, medicinal herbs, forest products and other incomes to farmers which is source of livelihood. There is need to create global agroforestry system awareness and growers should contribute in development of the system. It boosts the tree cover areas globally, economically viable, livelihood sustainable and has positive on ecological impact.

Keywords: Agroforestry, Food security, Climate change, Biodiversity, Livelihoods.

Species composition and ethnomedicinal value of homegarden agroforestry in Mizoram, Northeast India

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Abstract

Ten homegardens were selected based on accessibility to study the composition of species and its enthnomedicinal value. *Trevesia palmata* and *Clerodendrum colebrookianum* showed highest frequency and density in the study site. *Acacia pennata* and *Parkia timoriana* were found in most of the homegardens which provides a potential source of income for the people during the peak season. Fruit constitute the highest parts having market and medicinal value compared to other parts of the plant. The distribution pattern of plant species from the study highlight that out of the total 60 species, 53 species show a contagious pattern of distribution which clearly reflects lack of management practices in various home-gardens. Being a source of multiple products, regular tending operations (thinning, pruning etc) and a proper spacing of plants during its initial stage of development has to be maintained to avoid competition from nutrients and light among the species that could help them to generate more income and a better alternative farming practices that proves to be more beneficial in conserving the biodiversity of the area.

Keywords: Agroforestry, Density, Ethnomedicinal, Frequency and Homegarden.