was participatory with qualitative and quantitative variables for monitoring soil and people begin to identify the benefits represented by a sustainable use. This was done by conformation of local researchers committees and the installation of farm field experiments. The methodology resulted in the improvement of productivity and sustainability of farming practices, which in turn has contributed to improve food security. After six years, more than 70 hectares of degraded soils have been recovered and agrosilvopastoral systems (ASPS) have been established incorporating the native woody species: *Acacia farnesiana*, *Prosopis juliflora*, *Cordia alba* y *Guazuma ulmifolia*, and *Panicum máximum* cv *Mombasa* sp. associated with the production of more than 50 tons of food (black beans, watermelons, buttercup squash and corn) that provide food security and increase the productivity of the land through the improvement of the soil. The assessment demonstrates that there is widespread recognition and value of importance from farmers and technicians towards ASPS that include the native woody species. Farmers recognize their contribution to the support of animals in the most critical times and to the provision of services.

Determination of financial risk in agroforestry system susing Monte Carlo method

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This work dealt with the determination of the financial risk in a silvopasture system implemented in the Northern region of the State of Minas Gerais. Five genetic materials were used with the intention to select the best one for the plantation in large scale. There were used traditional methods of analysis (NPV, EPB, IRR) of the investments with the discount tax of 8% p.a. to calculate the profit in a database obtained in a property in the North of the State of Minas Gerais. The analysis with the traditional methods of financial viability of projects yielded a Net Present Value (NPV) of R$ 2,906.90/ha for the most significant clone. The method Monte Carlo was used for the determination of the risk and the comparison of the values of the deterministic methods. To the values of a historical series of prices of wood and calf was applied GIRP (General Index of Retail Prices) as a deflator. The results showed that the NPV with an application of a CMM has a value of R$6,342.95/ha with more the 80% of probability of occurrence. Compared with the original activity of the property, the cattle raising, the Silvopasture System offers more investments returning conditions.

Prognoses for growth and timber production and economic assessment of *Pinus taeda* in monoculture and in integrated silvopasture systems / *Prognose do crescimento e da produção madeireira e avaliação econômica de Pinus taeda em monocultivo e em ILPF*

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Este trabalho teve por objetivos estimar o crescimento e produção madeireira e avaliar a rentabilidade econômica de *Pinus taeda* em monocultivo e em sistema de integração lavoura-pecuária-floresta (ILPF). Foram simulados sete regimes de manejo por meio de softwares desenvolvidos pela Embrapa Florestas. Os regimes foram divididos em dois experimentos: o primeiro com quatro tratamentos (R1, R2, R3, R4) em ILPF delineados com espaçamento 3,0 m x 2,0 m e distância de 14 m entre os renques, diferenciando-se entre si pelo número de fileiras no renque (fileiras simples, dupla, tripla e quádrupla); e o segundo com três tratamentos (R5, R6, R7) em monocultivo com 1667 árvores por hectare. R1, R2, R3 e R4 tiveram corte final projetado para 20 anos, com desbaste seletivo de 50% da população aos 10 anos. R5 teve desbaste seletivo de 40% da população aos 10 e 15 anos, com corte final aos 20 anos. R6 teve desbaste seletivo de 50% da população aos 12 anos e corte final aos 20 anos. O tratamento R7 foi projetado sem desbastes e com corte final aos 16 anos.Em nossa simulação, as árvores propiciaram retorno econômico nos sete tratamentos avaliados, indicando que, além de diversificar a produção, a inserção da árvore na propriedade rural pode ser considerada uma atrativa fonte de renda. Com esses tratamentos,mostramos que os softwares para manejo e análise econômica de florestas podem auxiliar produtores na tomada de decisão para a implantação do componente florestal em suas propriedades.

Assessment and seasonal production of herbaceous forage biomass and correlation between environmental variables and basal area / *Avaliação e produção estacional de biomassa herbácea forrageira e correlação entre variáveis ambientais e área basal*

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Este estudo foi realizado em duas áreas sob formação florestal Floresta Ombrófila Mista, no município de Turvo-PR, uma área de floresta secundária e uma área de sistema silvipastoril natural, tendo como objetivo quantificar a produção estacional de biomassa herbácea forrageira e inferir as diferenças entre as áreas em função do seu manejo. A coleta de biomassa e componente botânico seguiu a metodologia Botanal, a área basal arbórea foi obtida por meio da dinâmica florestal. Foram avaliadas as variáveis ambientais:insolação, precipitação, radiação solar, temperatura máxima, média, mínima e umidade relativa. A maior produção de matéria seca ocorreu na área silvipastoril, no outono, com média de 265,44 kg MS.ha^{-1}, na área de floresta secundária não houve estação de maior produção, com menor média na primavera, 35,33 kg MS.ha^{-1}. *Panicum* sp. apresentou a maior produção de biomassa, no outono no sistema silvipastoril e verão na floresta secundária. A porcentagem de solo descoberto não apresentou diferença significativa entre as estações no sistema silvipastoril, na área de floresta secundária a menor porcentagem foi no inverno 48,90% e a maior na primavera 65,39%. A análise composta por variáveis ambientais, biomassa e área basal, resultou uma correlação alta negativa entre biomassa da área silvipastoril e temperatura máxima, apresentando ainda correlação significativa entre biomassa do inverno na floresta secundária e área basal. O gênero *Panicum* sp. é predominante na produção de biomassa de ambas as áreas, está presente em todas as estações do ano. Temperatura máxima e biomassa do sistema silvipastoril apresentam uma relação inversamente proporcional.

Double and simple entry equations for estimating the volume of trees established in integrated silvopasture systems / *Equações de dupla e simples entrada para estimação do volume de árvores estabelecidas em sistemas silvipastoris*

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O objetivo deste trabalho foi avaliar a precisão e a acurácia de equações de simples entrada para estimação do volume individual de árvores de eucalipto estabelecidas em sistemas silvipastoris. Foram ajustados sete modelos volumétricos, sendo quatro de simples e quatro de dupla entrada, para dois clones de eucalipto (GG 100 e I 144) plantados em dois diferentes espaçamentos (15 x 3 e 15 + (3 x 2)) e um híbrido de *Eucalyptus grandis* x *Eucalyptus urophylla* propagado por sementes, também em dois espaçamentos (15 + (3 x 2) e 15 + (3 x 2,5)). A partir dos valores das variáveis Ht, Dap e Vt obtidas através do método de cubagem proposto por Smalian, foram ajustadas as equações volumétricas de simples e dupla entrada para cada material. Os modelos foram ajustados pelo

método dos mínimos quadrados não lineares via o algoritmo de Gauss-Newton, e a seleção do melhor modelo para cada estrato foi baseada em três critérios: Índice de Furnival (IF), coeficiente de determinação ajustado (R^2aj) e análise gráfica dos resíduos. De forma geral, os modelos de dupla entrada apresentaram resultados mais satisfatórios para todos os casos, com destaque para os modelos de Spurr logaritimizado e Schumacher & Hall logaritmizado. Entretanto, os modelos de simples entrada demonstraram estatísticas muito próximas daquelas observadas para os modelos de dupla entrada, com destaque para os modelos de Husch e Brenac. Neste sentido, o uso de equações de simples entrada pode ser recomendado, principalmente no caso de pequenos produtores, como forma de tornar a aferição da sua produção menos onerosa.

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Early growth and development of black locust (*Robinia pseudoacacia* L.) in root sucker-regenerated stands in the Northwest of Romania

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In the Northwest of Romania, a region with a warm (mean annual temperature 10.30 °C) and quite dry climate (mean annual precipitation 573.3 mm), forest vegetation covers about 12% of the total area of continental sand dunes part of Carei - Valea lui Mihai Plain, with black locust (*Robinia pseudoacacia* L.) as the main tree species covering ca; 3,000 ha (over 80% of all forestland). Since its introduction in the area, black locust has been treated as low coppice, usually on a rotation of 20-30 years. In these stands the most commonly used rejuvenation method is by root suckers as black locust develops horizontal, shallow and wide-spreading roots which can extend to 15-20 m from the parent tree. The paper outlines the main results of a research and demonstration project on regeneration and early growth of black locust in the NW of Romania started in 2016. It was carried out in two young and pure black locust stands, naturally regenerated by root suckers following simple coppice cuts and removal of stumps. The initial growth of young black locust individuals was quick in both height and diameter. Consequently, the newly established stands have closed the canopy within two years regardless the initial stocking or basal area, resulting in effective sand dune stabilization and control of wind erosion.

Resilience and dynamics of the landscape in the oak forests of the Galicia Eastern mountains (Northwest of the Iberian Peninsula)

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The landscape dynamics of the eastern Galician mountains is mostly effect of human intervention during centuries ago. Our research has studied the resilience and changes – environmental, socioeconomic and historical changes – in this region. The objective is to suggest a set of silvicultural actions for the conservation and improvement of the landscape of these lands. The study focused on the progression of the natural broadleaved forests, intensively exploited since ancestral times. These forests were transformed to agricultural land, exploited for the naval, metallurgical and railway industries, joined with Church possessions, suffered forest fires, and were replaced by fast growing species, mainly coniferous and, today *Eucalyptus nitens* Shining Gum. All of these actions have led to a reduction of the occupied area by them. Now, broadleaved forests cover small and generally sloped sites, remaining where the soil features often avoid other land use, however their natural regeneration is very limited by human activities. These sites have a much modified landscape, but with a slow transformation where the biodiversity conservation, the hunting phenomenon and the cultural or environmental tourism have a high importance. Their current situation raises the problem of their socioeconomic reconversion. From a positive standpoint, the area covered by these forests has recently increased, and there is a greater awareness of the importance of their conservation given the recognition as habitats of interest to the European Union, being part of the NATURA 2000 Network.

Influence of plantation stand structure change by thinning operation

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Taiwan Kagome Co., Ltd has implemented understory thinning operation in their *Swietenia macropnylla* plantation since 2011. Thinning rates set from 25% to 45%. In this study, we investigate the juvenile trees, which from 14 to 20 years. We use Three Parameter Weibull Probability Distribution, conducted from Maximum Likelihood Method to simulate the diameter distribution before thinning and after. As results, the Dn values of K-S test are all lower than threshold value (D0.05). The estimation results by Weibull Probability Distribution of different age trees demonstrate well, validate with 100%. It means this method is effective to display diameter distribution with different age plantations. With parameter of Weibull, a value, which is annual increasing of thinning plots shows from 0.81 to 0.93, all higher than Control plots (0.26). The b values represent three stages, which are before thinning, after thinning and six years after thinning. Operation method contains four groups, which are 1,760 trees/ha (Group A, b value = 13.5, 13.5, 14.5), 1,200 trees/ha (Group B, b value = 12.9, 10.0, 12.2), 1,000 trees/ha (Group C, b value = 9.9, 10.7, 9.1), and 800 trees/ha (Group D, b value = 13.6, 12.3, 14.7). The b value become lower as the distribution curve become smaller in Group A, B and D. After six years, diameter distribution goes bigger as tree age goes on. However, Group C has opposite results. The reason we found that lots of trees were dead because of pest and diseases hazards.

Challenges and options for future coppice management in Europe. Lessons from the pan-European COST Action EuroCoppice

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Coppicing takes advantage of the natural ability of certain tree species to regenerate vegetatively after cutting, releasing fast growing stool sprouts or root suckers. Various forms of coppice management systems have been established worldwide, supplying wood and NWFP to rural societies and local economies. With industrialization and the increased use of fossil fuels many European coppice forests have been converted to high forests or abandoned, but over 20 million