



Fertilization in Agroforestry Systems

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Fertilization is one of the most important practices that a farmer has to carry out in its farm. Fertilization can be carried out with organic or inorganic fertilizers. Experiments conducted in Galicia in silvopasture systems showed the different behaviour of the inorganic fertilization and the sewage sludge addition on productivity and biodiversity linked to the soil acidity. The experiments consist of applying sewage sludge in neutral (water pH close to 7) and very acidic (water pH of around 4.5) soils and compare them with the use of mineral fertilizers and no fertilization in silvopasture systems, as usually grasslands are fertilized but afforested lands in former croplands/grasslands areas are not fertilized at all. In soils with water pH close to 7, mineral fertilization caused a significant increase of pasture production that was in detriment of tree growth. The opposite happened when no fertilization was added: the fertility of the soil was high enough to increase tree growth but the lack of nitrogen reduced the potential pasture growth. When sewage sludge was added, both tree and pasture were growing similarly to the no fertilization and mineral treatment, respectively. This may be explained by the fact that, initially the sewage sludge application increased pasture production, but during the summer drought that usually happens in Galicia, tree growth was enhanced due to the inputs of organic matter associated to the sewage sludge that allowed the tree to overcome the summer drought, the limiting factor for tree growth. When similar treatments were applied in

very acidic soil we found that no fertilization treatments caused a low tree and pasture production due to the low fertility of the soil, while the fertilization with the mineral fertilizer caused an increase of tree growth but not of the pasture. This may be explained by the fact that the low soil pH prevents the pasture from taking advantage of the mineral fertilizer inputs that was subsequently. When sewage sludge was applied, it increased soil pH that make possible for the pasture to use the applied nutrients. Another experiment were organic fertilizer coming from agro-industry was tested, it was shown that low doses benefited tree production, as pasture is not able to grow up with low doses, but when increasing the dose grassland takes advantage of the fertilizer and tree growth diminishes due to the competition with the pasture. If sewage sludge dose was further increased then the development of both pasture and tree were favoured.



Figure 1. Fertilization during the implantation of a low walnut silvopastoral plot.

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