



Climate change mitigation and agroforestry systems

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Climate change is generating uncertainties in agrofood systems framework due to the speed of the change but also the increased appearance of extreme events which is caused by the increase of Green House Gases (GHG) in the atmosphere. Relevant international bodies such as the Global Research alliance, the FAO who establishes the concept of Climate smart agriculture as well as the IPCC (Intergovernmental panel on climate change) in the 1.5 Report identifies agroforestry as a negative emission technology that should be expanded to reduce GHG in the atmosphere. Mitigation options declared by the European Union includes (i) the reduction of the GHG emissions through a more effective use of resources and technological development (e.g. by better land/waste management better land/waste management through the better use of the resources promoted by agroforestry and (ii) the removal of GHG from the atmosphere (e.g. by trees in farms), while maintaining production and decreasing input needs. The soil plays an important role in counteracting the GHG emissions into the atmosphere because it contains the 85% of the carbon in terrestrial ecosystems. The main sources of soil carbon are the roots being them increased when woody perennials are present as highlights the Decision 529/2013/EU of the trees. The introduction of trees in arable lands increases the soil capacity to store carbon at deeper soil layers than tree less systems, which can be also associated to long term carbon stocks because the probability of C release to the atmosphere is reduced with the depth of the soil.

The initiative 4 per thousand established by the COP of Paris establishes that an annual growth rate of 0.4% in the soil carbon stocks, or 4‰ per year, would halt the increase in the CO₂ concentration in the atmosphere related to human activities. Moreover, silvopasture implementation has demonstrated to increase carbon store in the soil in pinus radiate, birch and cherry stands due to the dinamization of nutrients that animals with their faeces and urine cause. The degree of mitigation of climate change in agroforestry systems depends on the tree species and for example broadleaves are associated to store carbon in soils linked to small soil particles which store carbon for a longer period of time than coarse particeles. Better design of farming systems including agroforestry at farm, landscape and value chain level is essential to reach the 1.5°C while increasing competitiveness, sustainability and resilience of farming systems in Europe to fulfill food demand as shown by the FAO.



Figure 1. The trees with their shade favor the adaptation of livestock systems to climate change.

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