Design of agroforestry network in open agricultural landscapes

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Open agricultural landscape are found to be less efficient due to the productivity risks related mostly to drought, wind erosion and biodiversity loss. Only spatially continuous and properly designed shelterbelts/hedgerows network is capable to effectively mitigate large-scale environmental threats. Hence, Polish scientists developed the basic guidelines on preferred spatial features, species composition and vertical structure of woody patches for each of above threats, defined, based on update information.

Clumps of trees and belts designed to enhance agricultural landscape's biological richness on open agricultural areas should form net-shaped structure with base diameter ca 500 m. They should consist of continuous shrub layer and sparse trees of native species.

Shelterbelts may be effectively used to decrease evapotranspiration of agricultural crops, even taking into account their higher transpiration, resulted in 5-15% crop yield increase in some field experiments on cereals. As the effective range of shelterbelt (reducing wind speed, and being significant for field microclimate improvement in this way) reaches no more than 15 (5-20) multiples of its final height, projected horizontally from the tree. The open agricultural landscape should be partitioned with subsequent shelterbelts, located perpendicularly to prevailing wind direction. Shelterbelt mutual distances need to be up to 300-400 m, linked together by belts of supplementary hedgerows (at maximum possible distances up to 40 times the height of the hedgerow). Crown density (60-70% opacity counted from wind direction) appropriate shrubs species in the understory layer and terrain topography (best locations on plains or flat hill tops) are crucial to have an desirable effect.

Wind erosion is most serious threat during winter, therefore windbreaks operating as wind erosion leafless barriers should also have lesser optical porosity (the fraction of

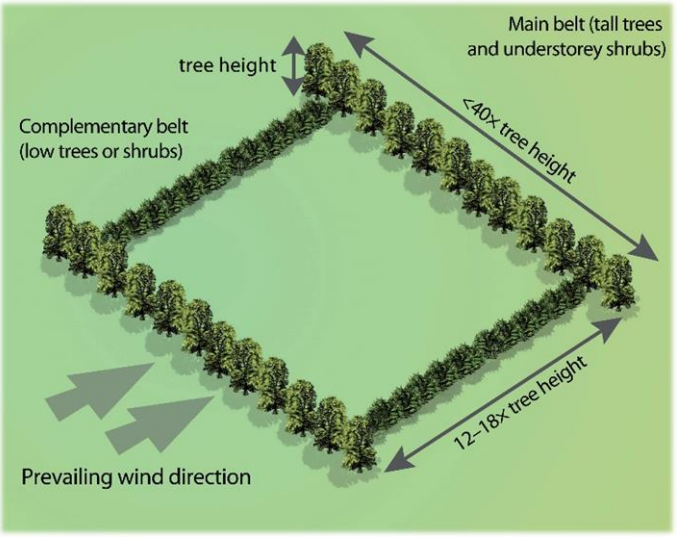

Figure 1. Windbreaks network scheme (Zajączkowski 2013)

Further reading:

Ryszkowski L., Bałazy S., Jankowiak J. (2000) *The programme for new farmland afforestations establishment.* Post. Nauk Roln., 47/52 (5), 83-107. [in Polish]

Zajączkowski J. (2016). *Ecosystem services by Trees outside Forests: should the structure and location of new planting matter more?* Proceedings of 3rd European Agroforestry Conference, Montpeller, 25-26.05.2016: 78-81.

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