How can trees maintain crop yields?

Climate change scenarios predict fewer but more intense rain events. Dry spring and summer weather reduces crop yields. Water loss from the crop is controlled by solar radiation, air temperature, wind speed and humidity.

Alley cropping systems can modify the crop microclimate by reducing wind speeds and temperature extremes. Lower wind speeds increase humidity levels around the plant surface, thereby slowing water loss.

Many crops that are protected by hedgerows of fast growing trees, managed as short rotation coppice, demonstrate increased photosynthetic rates and water use efficiency.

How can alley cropping be arranged?

For the establishment of alley cropping systems, seven fast growing tree species (willow, poplar, black locust, beech, alder, ash, and oak) are currently allowed in Germany. Soil pH should range between 5.5 and 8.5, soil depth should be at least 50 cm, and for growing willow and poplar there should be a minimum precipitation rate of 600 mm.

Effective site preparation and weed control are essential for the successful establishment of fast growing woody crop hedgerows. The trees should be planted in winter or spring. Planting material is available through commercial nurseries. The material will be either seedlings or, in the case of willow and poplar, cuttings produced from the previous year’s growth are also available. Planting may be done by hand or with mechanized planters. During the first growing year, weed control using chemicals should be carried out. During the second year, after root establishment, further mechanical weeding may be required.

Tree hedgerows can vary in width between 2 and 10 rows (2-15 m wide). Both single and double row designs can be used. Spacing for a single row design could be 2.55 m between rows and 0.4 m within the row. For a double row design, there should be 1.75 m between double rows, 0.75 m within the double row and 0.9 m within the row. The crop alley spacing can vary between 24 and 96 m.
Mechanical harvest of tree hedgerows of the alley cropping system. Ref: Kanzler, 2015