

Ecological characteristics of the tree species



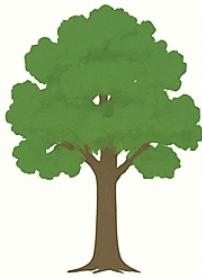
Scots pine
Pinus sylvestris

Light-demanding
pioneer
Drought-tolerant



European beech
Fagus sylvatica

Shade-tolerant
Competitive,
late-successional



Sessile oak
Quercus petraea

Semi-shade-tolerant
Deep-rooted,
drought-resistant



Norway spruce
Picea abies

Shade-tolerant
Sensitive to drought

Species behaviour in monoculture stands

- Scots Pine grows well on poor soils, uniform stands, and have a high drought and pest vulnerability.
- European Beech: dense canopy and quality timber, drought sensitive, limited regeneration on dry sites.
- Sessile Oak: valuable hardwood, requires light, regeneration difficult, risk from insects.
- Norway Spruce: fast growth, high yield, prone to storms and bark beetles.



Synergies in mixed stands



Pine → Beech: Pine canopy shelters beech regeneration.



Beech → Pine: Beech litter improves soil and nutrient cycling.



Oak: Enhances drought resistance and adds structural diversity.



Spruce: Increases short-term yield, improving early productivity.

Trade-offs and competition in mixed stands

- Beech/Pine: Beech overtops pine over time.
- Oak/Beech: Oak needs more light.
- Spruce competes with beech for moisture because it performs poorly on dry soils.

There is the need for proper management to balance competition and maintain mixture stability.

Key point: *from Pine monoculture to resilient mixed forest*