

Forage potential of five tree species, establishment techniques and maintenance of fodder hedgerows

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Forage potential of five tree species

The fodder tree species were selected according to their :

- adaptation to the Swiss climate
- growth rate and biomass production
- forage quality
- resistance to disturbance from cutting and grazing
- resistance to drought and frost

| Fodder trees | Digestibility | Protein | P | K | Ca | Mg | Condensed tannins |
|---|---------------|---------|-----|------|------|-----|-------------------|
| Mulberry (<i>Morus alba</i>) | 87 | 153 | 2.4 | 23.7 | 31.3 | 3.0 | 2 |
| Large-leaf linden (<i>Tilia platyphyllos</i>) | 87 | 161 | 3.1 | 14.0 | 31.6 | 4.3 | 26 |
| Manna ash (<i>Fraxinus ornus</i>) | 75 | 140 | 1 | 13.5 | 35.0 | 6.0 | 2 |
| Italian alder (<i>Alnus cordata</i>) | 61 | 171 | 1.4 | 11.9 | 15.6 | 1.8 | 13 |
| Goat willow (<i>Salix caprea</i>) | 77 | 160 | 3.5 | 17.6 | 15.4 | 1.5 | 39 |

Table 1: Average end-of-summer values for enzyme digestibility (% dry matter, DM), protein content, phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg) (g/kg DM) and condensed tannin content (g/kg DM) of the five fodder tree species selected for the experiment. Cost per tree 2.5 to 3 CHF.

Five species were identified as the most interesting for livestock in terms of **yield and forage quality** (Table 1). These species have **good digestibility values in late summer** (August), which are very comparable to, and often better than, the values generally observed for grassland vegetation at the same time.

Planting techniques

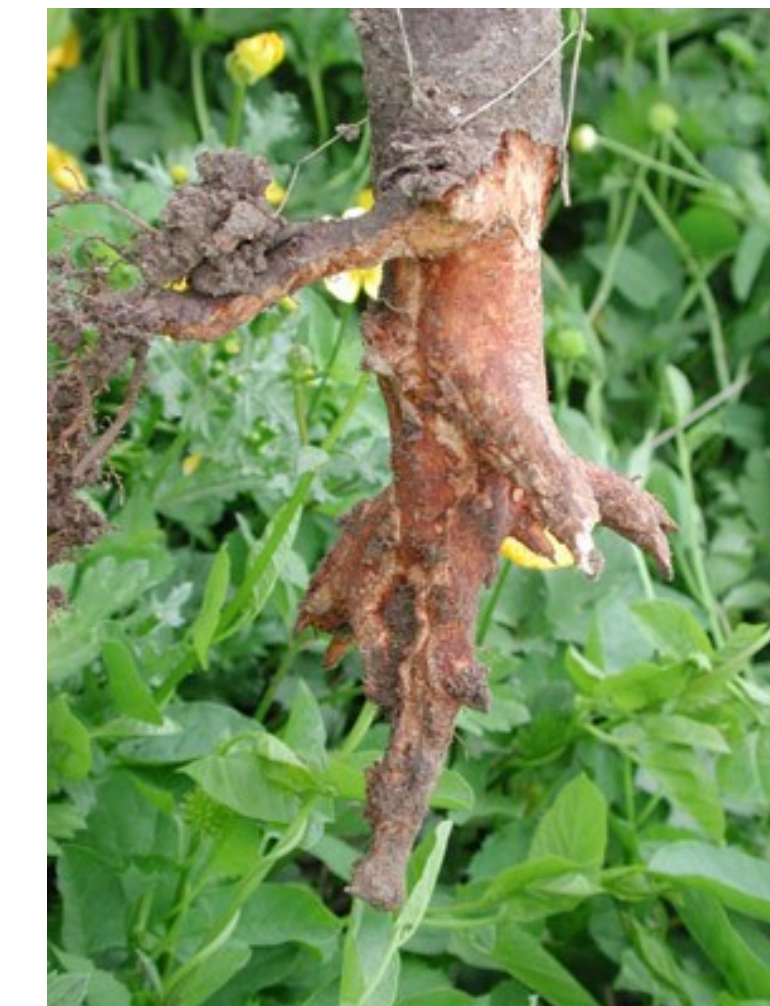
- Before planting, it is necessary to **stake** the area to be planted and **draw a line** for the hedge.
- The roots of the trees should be covered with a **damp cloth or similar** to prevent them from drying out. The roots should be **shortened** (1) before planting, which stimulates their growth.
- The soil can be **ploughed and harrowed** (2) before planting but planting can also be done **directly** (3).
- Planting can be **mechanized** (towed planter) (2) (3) or **manual** (4). The planting technique (tilled or not, mechanical or manual) does not seem to influence the survival of the trees.
- Hedgerows should be pruned **every 1 to 2 years** depending on the growth of the trees (maximum height 2 m) so that they can be fully exploited by livestock when there is a **lack of forage** in Summer.



Summary

Fodder trees have excellent potential to produce quality forage. Planting fodder hedgerows is a relatively simple operation (about 400 trees planted per person per day), but regular monitoring of the trees is required during the first two years to limit pest attacks and water when the soil is too dry.

Drivers of fodder tree mortality



Small mammals

Voiles and mice eat the tree roots and gnaw the bark of the crown. Piles of stones and perches to attract predators, the installation of underground fences and gassing can limit the damages caused by these pests.



Deers and roe deers

Deers and roe deers eat the upper part of the main branch. The tree does not die systematically and it can grow back from the base. Fencing against wildlife is possible but this is very expensive.



Drought

Drought is a major problem immediately after planting because the root system of the trees is not yet sufficiently developed to access deep water resources in the soil (Figure 1). In case of drought, watering is necessary during the first two years of establishment. The addition of ramial fragmented wood under the trees maintains soil moisture and provides organic matter, which considerably improves the survival of the young trees. Ramial fragmented wood also limits the growth of weeds.

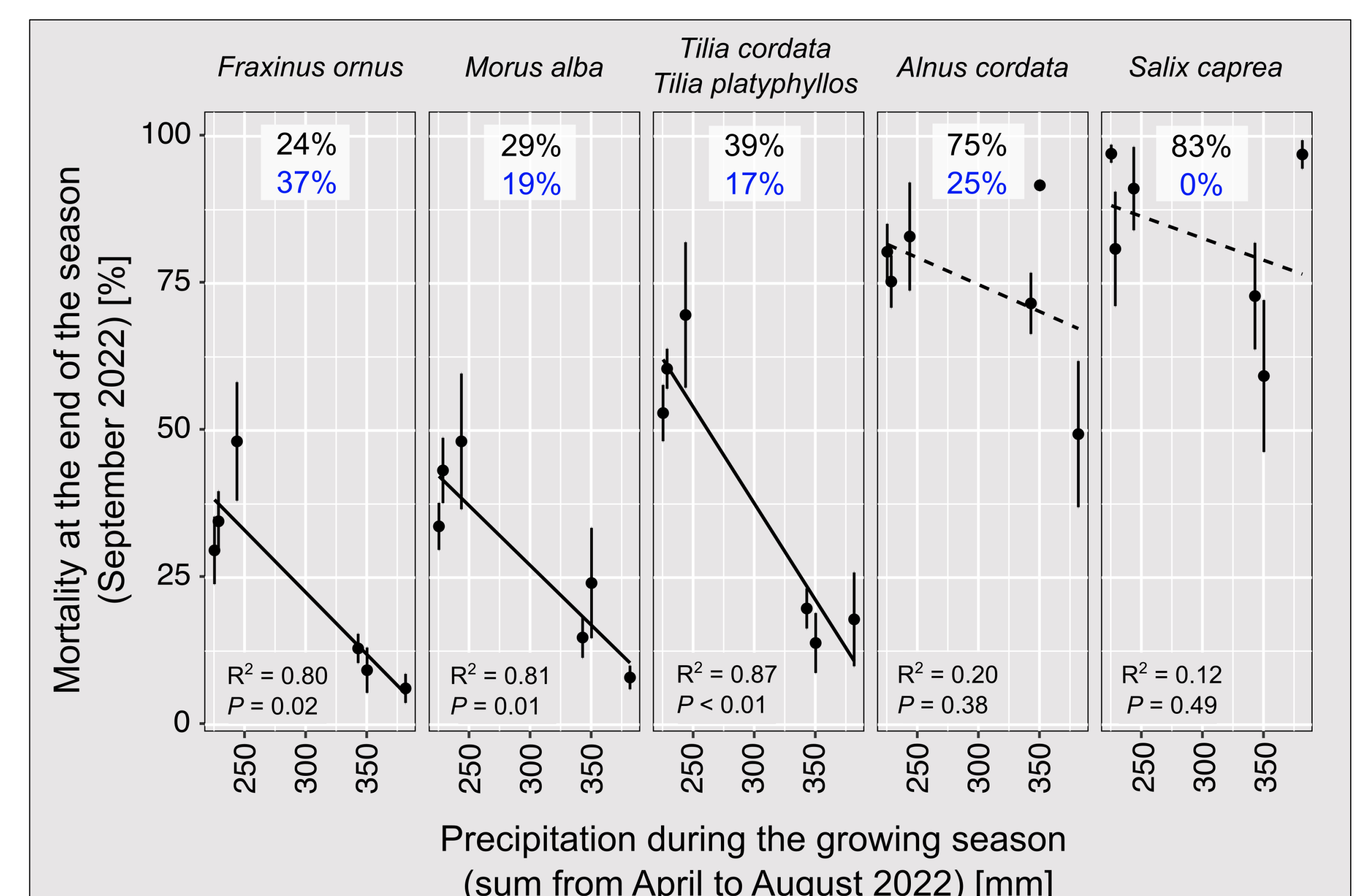


Figure 1: Mortality (%) of the five species in September as a function of rainfall during the growing season (April to August) in the year 2022 (very dry year). Mortality at the site with ramial fragmented wood is shown in blue.

