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Grass growth and impact of grazing

Mendel University
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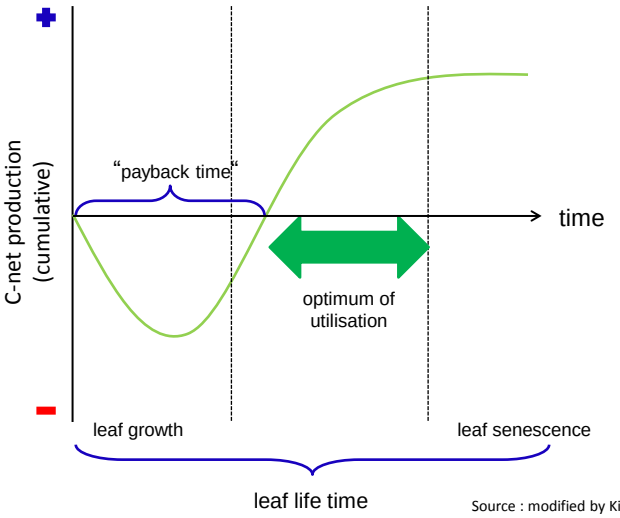
Walter Starz | Bio-Institut | www.raumberg-gumpenstein.at

Impact of cutting and grazing

Leaf life time and utilisation



Source : modified by Kikuzawa, 1995

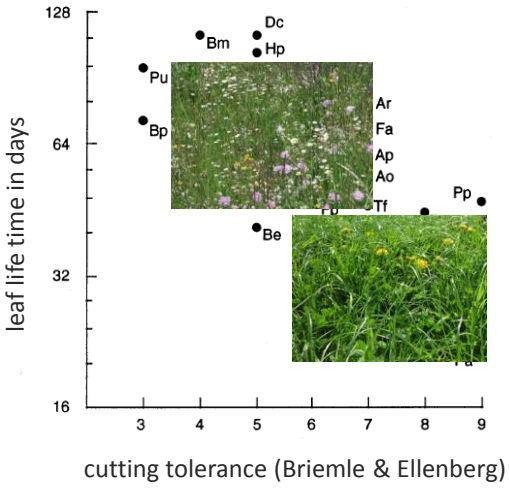
Leaf life time and utilisation

- Different leaf life time of grass species
- Normally three photosynthetic active leafs
- Optimum point of cutting or grazing is before the end of leaf life time
- Cutting or grazing below "pay back time" will damage the plant

Leaf life time and utilisation

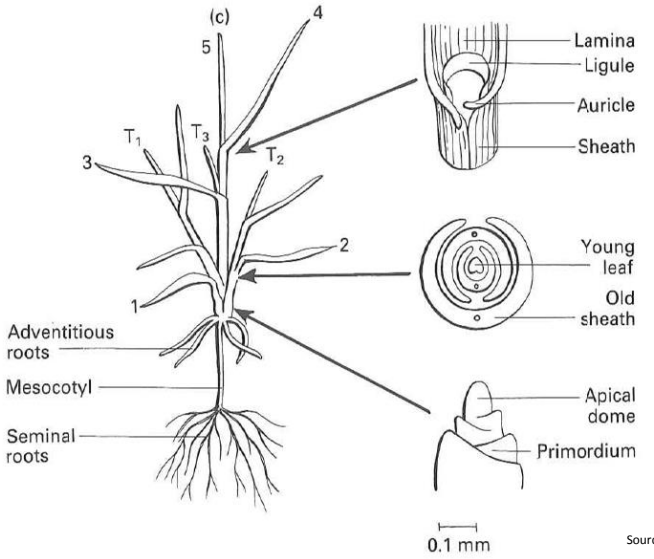
- payback time differs between species
- some species adopt payback time to utilisation
- continuously utilisation before payback time will damage the plant and leads to dieback
- leaf appearance interval is about 15 days for grass and 10 days for white clover at 14 °C
- leaf life time is the sum of three leaf appearance intervals and represents 50 days

Cutting tolerance of grass species



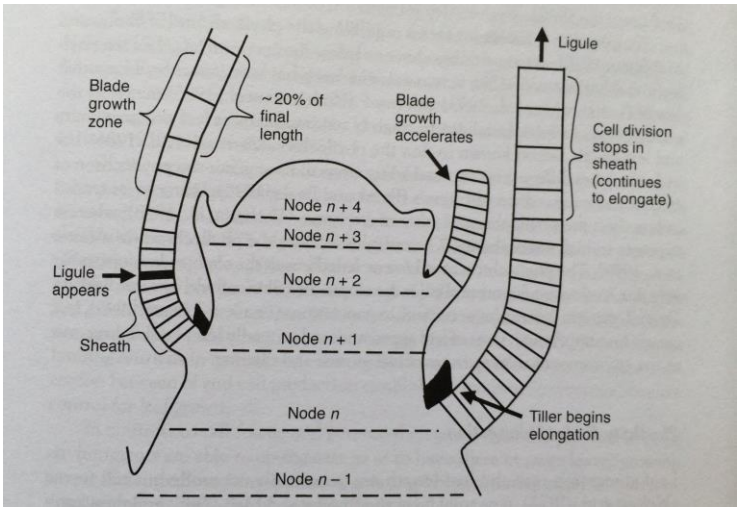
Source: Ryser & Urbas, 2000

Grass plant



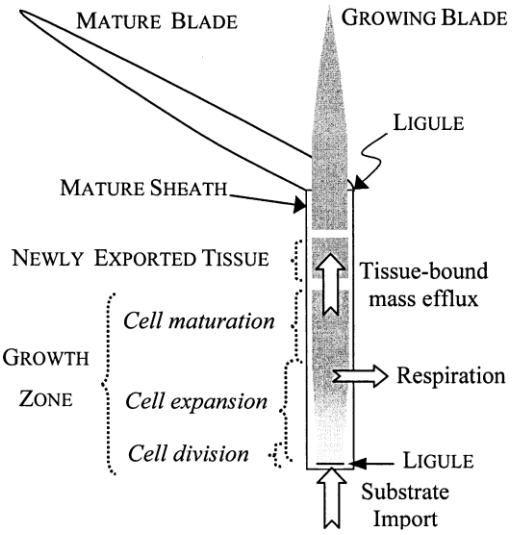
Source : Hopkins, 2000

Shoot apex



Source : Skinner and Nelson, 1995

Grass growth

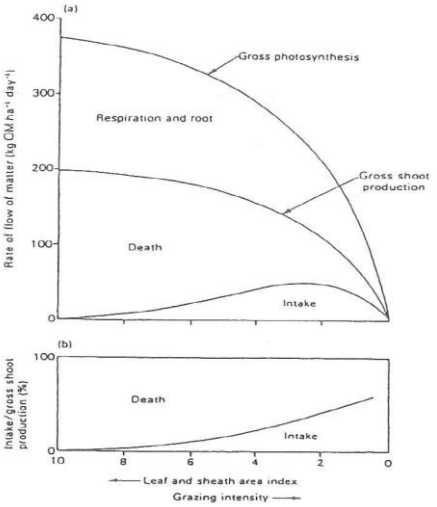


Source: Lattanzi et al., 2004

Grazing Systems

Grazing intensity

- maximum pasture yield is not equal to efficient grass intake
- This correlation tends to low swards on grazed areas and will increase efficiency



Source: after Parson et al., 1983

Phytomer

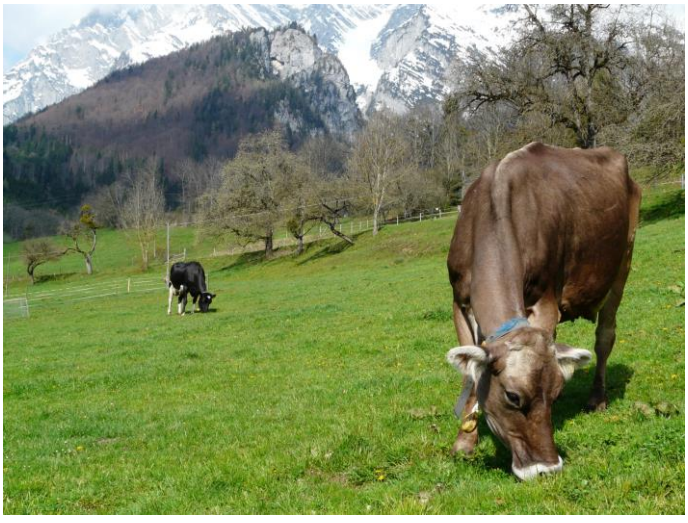
Grazing effect on tillers

- Perennial ryegrass dominated grassland

	Number of tillers	*% of seed tillers*	*Tiller weight in g DM m^{-2}*	*Length of tillers in cm*	*LAI*
Cutting regime					
1st cut at 7th of June	8,330	74	548	-	-
Cutting every 4 weeks until 7th of June	12,097	69	388	-	-
Continuous grazing					
3 cm height	43,464	14	44	1.3	1.6
6 cm height	33,765	31	106	3.6	2.3
9 cm height	20,132	47	202	7.1	3.8
12 cm height	14,311	59	333	9.2	4.6

Source: Johnson and Parson, 1985

Early spring grazing



Grazing and numbers of tillers

- Leaf life time of grazed spices like *Poa pratensis*, *Lolium perenne* or *Trifolium repens* is reduced in contrast to cutting management
- Early spring grazing increases utilisation intensity and leads to more produced leafs as well as more tillers
- Dense grazed swards are effected by more produced grass leafs per year in comparison to extensive utilised swards

Grass growth in grazed swards

Continuously grazed sward

Rotationally grazed sward

Rotationally grazed sward

Interaction grass herbs

Effect of cutting and grazing

- substrates of senescent leaf will be transferred to new produced leafs
- nitrogen from senescent leafs could be recycled up to 80 % of the total amount
- youngest leaf shows highest nutrition contents and also highest photosynthetic activity

Effect of cutting and grazing

- defoliation stopped root growth
- plant invest whole energy to produce new leafs
- carbohydrate reserves of the plant will be used
- substrate fluxes are working on a very high level

Effect of cutting and grazing

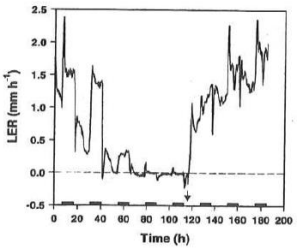
- grass leafs could reach growth rates of 1-2 mm per hour
- plant takes at first nitrogen from reserves before absorbs from the soil
- intensive cutting or grazing management will reduce root biomass by increasing up soil biomass

Water stress

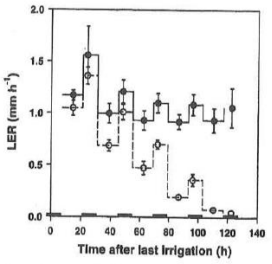
- grass growth will stop immediately at water stress
- at night better conditions for growth during drought
- gentle drought increases root growth for a short period

Water stress

- impact of water stress on grass growth
- leaf elongation rate of *Festuca arundinacea* at different rates of water supply



LER (leaf elongation rate)



Source: Durand, et al., 1995

Thank you for your attention!