

Sorrel and reed canary grass in southern Norway

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Summary

Reed canary grass *Phalaris arundinacea* 'Bamse' was established in Grimstad, Norway in 2002. Average yield has been 7250 kg_{d.m.}ha⁻¹ by spring harvest. Water content was some years quite high and makes reed canary grass a risky crop. In 2006 a small test field with a sorrel hybrid, *Rumex patientia* x *Rumex tianschanicus* 'Rumex OK-2' was established. Sorrel developed quite well and produced a harvestable crop already in August 2007. Yield in 2007 of the flower stalks alone was 5200 kg_{d.m.}ha⁻¹. In 2008 we discontinued fertilization and hoeing. The yield subsequently decreased in 2008 to 2370 kg_{d.m.}ha⁻¹ of flower stalks. Relative high water content in the stalks and new green leaves in August makes a swather or artificial drying necessary. In order to achieve a sustainable production the energy crops are neither treated with pesticides nor irrigated.

Soil and climate

The soil is medium sandy with a clay content of about 5 %. The mould content is stabilized to 3.0-4.5 % after 5 cm of composted sewage sludge and saw dust was harrowed in prior to the establishment in 2002. The mean annual precipitation is 1230 mm and mean annual temperature is 6.9 °C in Grimstad, which is situated on the southern coast of Norway.

Reed canary grass



Figure 1. Reed canary grass 'Bamse' 4 December 2008.



Figure 2. A dry harvest of reed canary grass 2 April 2007.

Reed canary grass is an easy crop to grow, produces reasonable yields, and is well suited for combustion (Burvall, 1997), see table 1. The high water contents are difficult to avoid as there are only few good harvesting days due to the relatively moist and warm coastal climate. This makes reed canary grass a risky crop in order to get a dry storable crop before new leaves sprout in spring.

Table 1: Yield and combustion characteristics of reed canary grass established in 2002. Fertilization level was 85 kg nitrogen ha⁻¹ yr⁻¹.

Year	2004	2005	2006	2007	2008
Harvest date	30 Mar	19 Apr	24 Apr	2 Apr	3 Mar
Water content, % (SEM)	11.9 (0.44)	8.6 (0.30)	25.4 (1.67)	9.5 (0.78)	57.2 (2.21)
Yield, kg _{d.m.} ha ⁻¹ (SEM)	6650 (344)	8000 (144)	6540 (98)	6100 (289)	9000 (276)
Ash, % _{d.m.}	2.6	2.3	3.0	2.2 ^{*)}	2.4 ^{*)}
Net calorific value, MJ kg _{d.m.} ⁻¹	16.6	16.46	16.88	18.35 ^{*)}	18.44 ^{*)}

^{*)} Determined by Eurofins, Lidköping, Sweden

The yield should normally decrease annually for our type of climate after the second ley year (Landström *et al.*, 1996). This was also observed here until the fifth ley year, where the yield was even better than in the second ley year. One explanation might be a very optimal water supply in 2007.

Sorrel



Figure 3. Sorrel 'Rumex OK-2' at the harvest 6 August 2007. Development of new leaves simultaneous with the drying of flower stalks in August necessitates special drying measures to achieve a storable crop.

Sorrel is a perennial, which can be harvested dry continuously in summer with high yields for more than 10 years according to Ust'ak & Ust'akova (2004). Sorrel produces a lot of seeds, 500 kg ha⁻¹, enough for 100 ha with 5 kg ha⁻¹, which is the recommended sowing rate by (Ust'ak & Ust'akova, 2004). We harvest sorrel in August. Our harvesting procedure is first to cut the flower stalk with secateurs, then the remaining leaves are harvested with a motor scythe. Leaves were harvested the first time in 2008.

Table 2. Yield and water content of sorrel established in 2006. Fertilization level was 65 kg nitrogen ha⁻¹ yr⁻¹ the first two years 2006 and 2007, and then no fertilization the third year.

Year	2007	2008
Date	6 Aug	15 Aug
Water content stalks, %, (SEM)	58.3 (3.35)	35.2 (4.99)
Yield, flower stalks, kg _{d.m.} ha ⁻¹ (SEM)	5170 (469)	2370 (68)
Water content, leaves, % (SEM)	n.d.	89.9 (0.16)
Yield, leaves, kg _{d.m.} ha ⁻¹ (SEM)	n.d.	370 (42)
Total, yield kg _{d.m.} ha ⁻¹	n.d.	2750
Total water content	n.d.	62.7
Ash, % _{d.m.}	5.3 ^{*)}	4.3 ^{*)}
Volatiles, % _{d.m.}	78.3 ^{*)}	78.7 ^{*)}
Net calorific value, MJ kg _{d.m.} ⁻¹	17.719 ^{*)}	17.786 ^{*)}

^{*)} Determined by Eurofins, Lidköping, Sweden

The yield in 2007 of the flower stalks alone was 5200 kg_{d.m.}ha⁻¹ (Table 2). In 2008 we stopped the fertilization according to Ust'ak & Ust'akova (2004). And we stopped hoeing as we expected sorrel could compete with the weed. The yield subsequently decreased in 2008 to 2370 kg_{d.m.}ha⁻¹ for flower stalks and 2750 kg_{d.m.}ha⁻¹ in total including leaves. The leaves account for only 13.6 % of the total harvestable dry matter. The achieved yields are very low compared to Ust'ak & Ust'akova (2004). Explanations may be:

- Sorrel did not produce new plants from the abundant amount of seeds.
- The leaves did not cover the soil totally.
- Discontinued fertilization the second year.

Fertilization and hoeing will be reintroduced in 2009.

References

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