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Survival of white, red and alsike clover at pasture under Nordic organic farming conditions

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Summer feeding of dairy cows is recommended to base on grazing in organic farming (EU 1804/1999, CEC 1999). Maintenance of sufficient legume level is the major factor influencing productivity of organic perennial swards. Red clover (*Trifolium pratense* L.) has been the primary sward legume in Finland owing to its good yield potential and winter hardiness, even though it doesn't tolerate well frequent cutting. White clover (*Trifolium repens* L.) is the most important pasture legume in temperate Europe. Recently, some cultivars have shown winter hardiness also in Finland (Nykänen-Kurki and Kivijärvi 1996). Alsike clover (*Trifolium hybridum* L.) is often recommended instead of red clover in unfavourable soil conditions. The aim of this study was to evaluate survival of white, red and alsike clover at organic pasture.

A field trial with four clover grass mixtures and one pure grass mixture was established with randomised complete-block design with four replications in Middle Finland in 1995. Seed mixtures included alsike clover, red clover, white clover or white + alsike clover (1:1) and companion grasses: meadow fescue (*Festuca pratensis* Huds.), timothy (*Phleum pratense* L.) and smooth-stalked meadow-grass (*Poa pratensis* L.). Winter hardy alsike, red and white clover cultivars 'Frida', 'Bjursele' and 'Jögeva4', respectively, were used. Seed rate was 25 kg ha⁻¹ including 8 kg ha⁻¹ clover in clover mixtures. The plot size was 17.50 m x 17.50 m. Soil texture was silty very fine sand of medium fertility (1360, 16, 165 and 196 mg l⁻¹ Ca, P, K and Mg, respectively) with an organic matter content of 30-60 g kg⁻¹ DM and pH(water) of 6.1. No fertilisers were applied. Plots were established with 90 kg ha⁻¹ grazed oats (*Avena sativa* L.) as a nurse crop. During experimental period (1996-1998) replicates were grazed rotationally (21-day cycle) five times per summer. Herbage samples were taken before each grazing period by hand cutting (six randomised areas of 74.0 cm x 22.5 cm at a height of 3 cm per plot). Botanical composition was determined by hand sorting (clovers, grasses and dicot weeds). Dry matter content of proportions was measured after oven drying (105 °C for 24 h).

Mean clover proportion differed significantly between seed mixtures (P<0.001, Table). Mixtures containing white clover maintained the highest clover proportion over the experimental period. Average clover proportion decreased from year to year (0.310, 0.192 and 0.121 in the 1st, 2nd and 3rd year, respectively). Clover proportion was always at lowest and nearly similar in all clover mixtures in spring, increased in summer and decreased again towards autumn. White clover could increase its proportion during summer more than other clovers. Natural small-leaved white clover surfaced gradually in pure grass plots.

Table. The effect of seed mixture on mean clover proportion.

Seed mixture	White clover	Alsike + White clover	Red clover	Alsike clover	Pure grass	Significance
Proportion of clover	0.265	0.235	0.182	0.148	0.126	P<0.001

In conclusion, white clover suited best for cow grazing under organic farming conditions in Middle Finland. However, the clover proportion of all clover mixtures decreased from year to year and varied within grazing season.

References

Nykänen-Kurki, P., Kivijärvi, P. 1996. Growth and seed production characteristics of white clover cultivars in the Lake District of Finland. *Grassland Science in Europe* 1: 127-131.