Yield formation of fibre nettle (*Urtica dioica* L.) in organic farming

P. Lehne, K. Schmidtke and R. Rauber

Institute of Agronomy and Plant Breeding, Von-Siebold-Str. 8, 37075 Goettingen, Germany
email of corresponding author: rrauber@gwdg.de

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Introduction

The perennial Stinging Nettle was used as a plant fibre resource in Europe during the middle ages. In the first half of the 20th century, varieties with elevated stem fibre content were bred. Today, these so-called fibre nettles may be attractive as a renewable resource, which could additionally improve agrobiodiversity.

Material and methods

Two field experiments were carried out near Goettingen, Germany (51° 32´ north, 9° 56´ east) as randomised block designs (4 replications) during the years 1999 to 2001 on a degraded chernosem. Row spacing was 150 cm, planting density was 2.86 plants per m². In trial 1 (planted in 1997) different treatments of fertilisation were tested. All fertilisers were incorporated into the soil between the nettle rows in early May of each year. Crimson clover, grown as green manure during the winter-season between the nettle rows was combined with stone meal. Averaged over years, symbiontical nitrogen fixation was about 40 kg·ha^{-1}·a^{-1}. Stone meal was applied in a quantity equal to 100 kg K·ha^{-1}·a^{-1}. Organic compost (biowaste) from communal collections (100 kg N·ha^{-1}·a^{-1}), liquid and solid manure (70 plus 30 kg N·ha^{-1}·a^{-1}) and a control (without fertilisation) were the other three treatments. The second trial investigated 7 fibre nettle varieties (planted in 1999), which were fertilised first in 2001 with 50 kg N·ha^{-1} as cattle slurry. Yield was measured at ripeness (middle of August each year).

Results and discussion

Trial 1: Fibre yields were highest on the manure plots, followed by the biowaste plots (Fig. 1). Yield decreased from 1999 to 2000 but in 2001 it was similar to 2000. Fibre yields correlated well with stem length ($r^2 = 0.76$ ***).
Trial 2: Yearly average fibre yields ranged from 150 kg to 460 kg·ha^{-1}·a^{-1} (Fig. 2a) without differing significantly between years. High yields were realised by high stem yield and average fibre content or average stem yield but high fibre content (Fig 2b, e.g. varieties 2 and 3). Stem dry matter and length were positively correlated ($r^2 = 0.50$ ***).

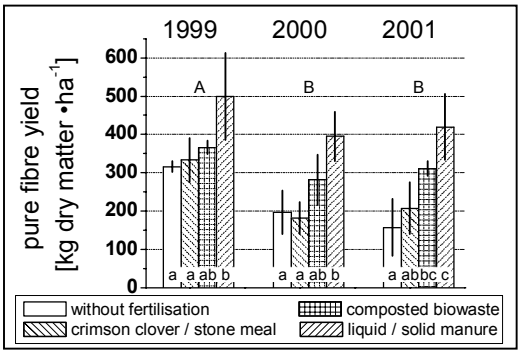

Fig. 1: Fibre yield (trial 1; $\pm s_x$). Small letters: significant differences between treatments within one year (Tukey, $\alpha = 0.05$), capital letters: significant differences in yield between years (repeated measures ANOVA, $\alpha = 0.05$)

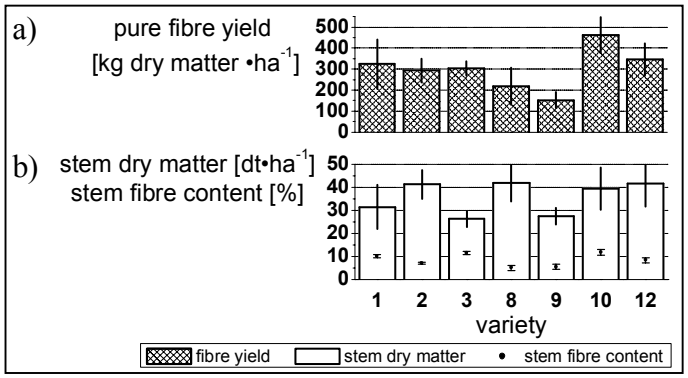

Fig. 2: Average fibre yield, fibre content and stem yield of seven fibre nettle varieties during the years 2000 and 2001 (trial 2; $\pm s_x$).

Conclusions

High-growing plants with high fibre content produce best yields and can be considered to have higher weed suppressing abilities. These varieties should be preferred in organic farming. Fibre nettles need sufficient amounts of nitrogen to yield high and stay competitive. Due to its lower fibre content in comparison to fibre hemp or flax, successful cultivation of fibre nettle requires that farmers earn a comparatively high profit from the harvested nettle straw.