

Summary

Bast fibres of hemp (*Cannabis sativa* L.) show some advantageous properties (low density, high tensile strength and stiffness) which make them suitable for fibre reinforced composites. Nevertheless, the origin of variability in fibre characteristics is uncertain. Therefore, the present study evaluates the effect of the agricultural technology (harvest date, post harvest straw management on the field, retting, fibre extraction) on the physical characteristics of hemp fibres.

Plant material was obtained from two field trials, both located in central Germany, one at Leipzig-Seehausen (51° 24 min north, 12° 25 min east; cv. USO 31, cv. Kompolti, cv. Fasamo) in 2000-2002 and another at Zichtau (52° 36' min north, 11° 18' min east; cv. USO 31, cv. Fedora 17, cv. Futura 75, cv. Epsilon 68) in 2003. The growth of hemp was quantified on basis of stem volume at constant moisture content. The degree of retting was identified with the help of a rating scheme. Different methods (hammer milling, breaking and cottonizing) were applied for decortication and fibre refining. Fibre characteristics were derived from tensile test.

Ripening of fibres is completed with stem growth. In this stage, recommended for the harvest, hemp canopies are defoliated by 80-90%. In the subsequent period stem colour may change from green or yellowish-green to yellow and brown. Further, the tensile strength may increase whereas other fibre characteristics were changing inconsistently. The field machinery for harvesting, chopping, swathng, baling effects fibre structure as indicated by increased elongation at maximum load. Length of the fibre specimen decreases with an increase in the degree of retting. Furthermore, strong retting yields fibres of low fineness, whereas optimum tensile strength corresponds to low or medium degree of retting. However, under conditions of practice difference in tensile strength may disappear due to an increased variability of fibre characteristics.

The evaluation of decortication technologies shows the following ranking: 1. breaking roller in combination with cottonizing devices, 2. hammer mill, 3. breaking rollers; whereas high quality of fibre batches corresponds to a low branching, shive content, high tensile strength and stiffness, low fineness and elongation at maximum load. The investigations demonstrate that steps of hemp cultivation and fibre extraction are sensitive in affecting the quality of the fibre commodity.