

# ***Spartium junceum* L., A NEW CROP FOR NATURAL FIBRE FOR AUTOMOTIVE INDUSTRY**

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During the last years, an increasing awareness of the public opinion about environmental and health problems pushed towards the utilisation of natural raw materials, drawing the attention to industrial fibre crops. Industries all over the European Community are looking for raw material for replacing artificial fibres in composite materials to alleviate problems related with composite materials disposal at the end of the technical life. In Europe the use of natural fibres in the automotive industry in 1999 was about 21,300 tonnes and in 2000 about 28,300 tonnes. In 2005 the use of natural fibres could increase to 50,000 to 70,000 tonnes and in 2010 to more than 100,000 tonnes of natural fibres for the effect of EU end-of-life vehicle directive than influence this development. The sources of raw material used in composites for automotive industry are mainly represented by flax, hemp, jute, kenaf, sisal and coconut fibre. Recently there has been a revival of interest in Spanish Broom as a possible source of natural fibre in automotive industry. Spanish Broom (*Spartium junceum* L.) is a perennial shrub growing in hot and dry climate throughout the Mediterranean area, where it naturally occurs in hilly soils, contributing to lower erosion and risks of nutrient leaching. The stem fibres have been used since ancient time as hemp substitute being used mainly for coarse fabrics and cordage. In order to explore the possibility to grown Spanish Broom in Italy as fibre crop, a 10-year field trial has been carried out between 1992 and 2002 at the Department of Agronomy of the University of Pisa (about 43°N; 10°E) on a deep silt loam soil.

The chemical and physical properties of the derived fibres were also examined in order to evaluate the feasibility to use them in composite materials. Results demonstrate that after established Spanish Broom can reach a fresh biomass yield of about 3750 g m<sup>-2</sup> corresponding to 1620 g m<sup>-2</sup> dry yield per annum as 1993-2002 mean value. The dry yield was composed of 56% new branches, representing the economic yield. The dry branchlets yield was 930 g m<sup>-2</sup> per annum as 1993-2002 mean value. The moisture content of branchlets averaged 60% and it is important for the necessity to storage raw material with low moisture content and to maximise the marketable products. This species appeared drought tolerant; moreover it is a nitrogen-fixing plant and therefore could be cultivated on marginal lands due to its low input requirements.

Spanish Broom cortical fibres are multiple elementary fibres (ultimates) arranged in bundles. The elementary fibres are bound together by lignin. A thick secondary cell wall indicates a high cellulose content. The diameter of ultimates varies from 5-10µ while the diameter of the whole bundle is about 50 µm. The chemical composition of the whole stem outlined a high content of cellulose (67-76%) while lignin (13-22%), pentosans (4-5%) and extractives (6-7%) were low. The values in tensile strength and elastic moduli are promising supporting the hypothesis that these fibres can be a potential replacement for man made fibres in composite materials.