

UTILISATION OF WOODY BIOMASS FROM URBAN PARKS, STREET TREES AND PLANTATIONS OF FAST GROWING FOREST TREES – POSSIBILITIES FOR ENERGY PRODUCTION, CHEMICAL AND BIOLOGICAL CONVERSION

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ABSTRACT

It is general known, that the existed forests in the world can provide significant biomass sources for energy use. However, it is very important to utilize theoretically ‘waste’ woody biomass coming from cuttings and tree pruning in urban and sub-urban parks and also from street trees in cities including also weed trees (e.g. *Ailanthus* spp., *Robinia pseudoacacia*, *Acer negundo*). Additionally, with appropriate selection, we can utilize fast growing forest trees in urban and sub-urban green areas/parks and tree lines (where indicated) inside the cities as well as in energy plantations in sub-urban and close agricultural and forest lands. These trees are capable to grow 4-5 m and produce 20-30 tn/ha/year dry biomass, they have high coppicing ability, whereas their harvesting can start just 3-5 years after planting. Widespread plantations of fast growing forest trees can produce in short time period huge quantities of lignocellulose for energy production (thermal and thermo-chemical conversion) and for biological conversion (e.g. compost production) as well. Poplars (*Populus* spp.), willows (*Salix* spp.), eucalypts (*Eucalyptus* spp.), paulownias (*Paulownia* spp.), ashes (*Fraxinus angustifolia*), plane tree (*Platanus* spp.), milberies (*Morus* spp.), black locust (*Robinia pseudoacacia*), hornbeam (*Carpinus betulus*) and elms (*Ulmus* spp.) are examples of fast growing tree species for biomass energy: they sprout easily after cutting, they can be used in very short rotation periods (5-10 years) and are perfect for energy plantations. The fast growing forest trees can be used in a wide range of soils and many of them (e.g. *Eucalyptus* spp., *Populus* spp., *Salix* spp., *Juglans nigra*) are extremely capable for the restoration of lands with high pollution levels (phytoremediation), in urban and sub-urban areas. The woody biomass - as above described - is considered a renewable and sustainable source for energy production (through combustion and other methods), while simultaneously the green/soft part of plant biomass (e.g. leaves, thin branches, nuts/fruits) can be biologically utilized (e.g. composting, organic fertilizers) or for production of other organic products (e.g. mushrooms). The utilization of the mentioned woody biomass will reduce the pressure on the natural forests for finding such material. In the present work, a general overview and technical analysis of the use of fast growing forest trees in urban, sub-urban and agricultural and forest lands and the possibilities of biomass conversion into energy and chemicals and biological utilization as well is presented, based on research experience, experimental data and bibliography.

Key words: forest trees, fast growing, urban parks, street trees, forest plantations, woody biomass, energy, composting.