

INVASIVE PLANTS: ECOLOGICAL THREAT OR BIOMASS POTENTIAL FOR ENERGY USE?

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The main goal of this paper is contribution to discussion about use of invasive plants potential and minimalizing of their ecological threat. Can economic and legislative instruments help to solve ecological problems? The authors focus on CBA analysis as an effective tool to compare socioeconomic costs and benefits and on technological and law aspects connected with invasive plants, concretely knotweed. The CBA analysis data basis is gained from two case studies of invasive plant knotweed (*Reynoutria*) in the Czech Republic.

The spread of invasive organisms is considered one of the most serious ecological problems in the 21st century. Invasive species is usually defined as “a species that is non-native to the ecosystem under consideration and whose introduction causes or is likely to cause economic or environmental harm or harm to human health.” Many invasive plants cause huge losses in agriculture, livestock, fisheries, and other resource production systems. Some significantly alter ecosystems, even resulting in costly damages due to increases in fire, flooding, and erosion.

Knotweed (*Reynoutria*) Japanese and Bohemica is one of the most widespread invasive plants in the Czech republic. This plant usually occupies positions along natural biocorridors (river flood-plain) or artificial corridors (e.g roads, railways, brownfields...). Knotweed poses a significant threat to riparian areas, where it can survive severe floods and rapidly colonize scoured shores and islands. Once established, populations are extremely persistent.

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There's growing demand for technologies using local alternative energy sources as a complement or even substitute to central energy technologies (mainly thermal power stations using fossil inputs). Only biomass and solar energy is usable in the Czech Republic conditions thanks to low number of appropriate water flows and only occasionally strong wind.

Both is based on solar energy, nevertheless plants utilize it four times more effectively than solar cells.

Knotweed is very perspective source of biomass, in comparison with standard plants nowadays used for biomass production it has several advantages: (i) possibility to use poor or even contaminated soil and highland areas which aren't suitable for corn production. (ii) Yield of dry mass can reach 30-40 tons per hectare (10 000 sq. m.), which is above standard in comparison with other plants. (iii) Knotweed doesn't demand any supporting fertilization, which rapidly reduces costs for its growing.

Knotweed is not named on list of plants of Ministry of agriculture of the Czech Republic which contains plants allowed to be grown for energy use. Moreover, production of knotweed is prohibited because of its invasive character. Authors of the paper think that it is not necessary to prohibit knotweed growing. Its energy potential is very high and when current legal regulations is respected knotweed can be grown without ecological threat.

The results of CBA analysis value socioeconomic costs and benefits of knotweed growing. As an input for CBA analysis data from projects of knotweed extermination located in the central part of the Czech Republic were used. The projects were realized by non-profit nongovernment organization for municipalities and supported by municipal budgets.

The main socioeconomic costs were set by valuation of extermination of 1 hectare of spontaneous knotweed vegetation considered as negative ecological burden. The pure opportunity costs method is not appropriate because of difficult valuation of affected areas value decrease. Willingness-to-pay method is not suitable because of low foreknowledge and low ability of objective harm valuation by affected subjects. Defensive costs method displays the same disadvantage.

For valuation of main socioeconomic benefits price of 1 GJ energy produced from technology using renewables was used. This price is considered as an equivalent of average price of 1 GJ energy produced from technology using fossil fuels.

The socioeconomic net value of knotweed growing is positive. As a result of CBA analysis we can set complex of conditions for feasibility of knotweed growing. The grower would be certified by the state authority. This instrument is nowadays widely used by growing certain species, e.g. cannabis for technical use.

This licence would be bond to conclusion of Voluntary Agreement for environment protection according to EU legislation (e.g. 96/733/ES). Voluntary Agreement would obligate grower to prevent knotweed spreading out of the growing area and he would be responsible for e.g. monitoring of plant occurrence in specified area.

Moreover, already valid national legal regulations with existing sanctions for nonpreventing of invasive plants spreading could be used.