



The availability and economic analyses of using marginal land for bioenergy production in China

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In recent years, China has witnessed rapid increase in the dependence of foreign oil import. In 2015, the primary energy consumption of China is 543 million tons, of which 328 million tons was imported. The total amount of imported foreign oil increased from 49.8% in 2008 to 60.41% in 2016. To address the national energy security and GHG emission reduction, China has made considerable progress in expanding renewable energy portfolio, especially liquid biofuels.

However, under the pressure of high population and vulnerable food security, China's National Development and Reform Commission (NDRC) ruled that bioenergy is only allowed to be produced using non-cereal feedstock. In addition, the energy crops can only be planted on marginal land, which is the land not suitable for growing field crops due to edaphic and/or climatic limitations, and other environmental risks.

Although there have been a number of studies about estimating the marginal land for energy plants' cultivation in China, as to the different definition of marginal land and land use data, the results are quite different. Furthermore, even if there is enough marginal land suitable for energy plants' cultivation, economic viability of cultivating energy plants on marginal land is critical.

In order to analyze the availability and economic analyses of the marginal land for bioenergy production strategy, firstly, by using of the latest and most authoritative land use data, this study focused on the assessment of marginal land resources and bioenergy potential by planting five species of energy plants including Cassava, *Jatropha curcas*, *Helianthus tuberosus* L, *Pistacia chinensis*, *Xanthoceras sorbifolia* Bunge. The results indicate that there are 289.71 million ha marginal land can be used for these five energy plants' cultivation, which can produce 24.45 million tons bioethanol and 8.77 million tons of biodiesel.

Secondly, based on field survey data and literature reviews, we found that, from the farmers' perspective, low income led to none incentive of energy plants' cultivation. From the bioenergy plants' perspective, unstable supply and high cost of feedstock constrained the normal operation. In China, both energy crop' s cultivation and bioenergy production depend too much on government subsidies. It was impossible to develop bioenergy based on marginal land if only rely on the market at present.