

Tropentag, October 6 - 8, 2009, Hamburg, Germany

Biophysical and Socio-economic Frame Conditions for the Sustainable Management of Natural Resources

## Impact of 12 Years Poplar Cultivation on Availability of Some Soil Nutrients in Safrabasteh, North of Guilan

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### Abstract

Fast growing plantations are likely to provide a huge quantity of raw material quickly and at a relatively low cost. Hybrid poplars, in Iranian conditions and suitable soils, offer a high productivity. Thanks to the use of clonal varieties it is possible to obtain material with homogeneous and well-known properties. The stand density is 400 stems ha<sup>-1</sup>. RIFR (Research Institute of Forest and Rangeland) planted many plots of hybrid poplar in Safrabasteh Poplar Research Station at 1993. This study was carried out in order to study influence of four poplar clone plantation on availability of some soil nutrients in Safrabasteh Poplar Research Station (Astaneh, Guilan Province). Experimental design was completely randomized block with 3 replications and four treatments (25 trees in each plot) as: A) *Populus euramericana*-214 B) *Populus euramericana*-45/51 C) *Populus deltoides*-77/51 D) *Populus deltoides*-69/55. Some of soil properties as pH, O.M, N, P, K, Ca and Mg were determined. The data were subjected to analysis of variance using the ANOVA procedures of the SAS program. Statistical significance was determined at P= 0.01. Analysis of variance showed that effects of different poplars clones are significant on soil parameters. The phosphorous, potassium, magnesium and organic matter contents in the upper layers varied in each plot. The rates of nitrogen and calcium did not change. The Duncan's multiple range tests following a significant F test compared means. Mean's comparison showed that the *Populus euramericana* 45/51 had greater positive effects on the soil parameters than other clones. Thus, it is suggested that suitable poplar clones should be used for future plantations projects, in the Guilan province.

### Introduction

Fast-growing trees such as poplars can be highly productive sources of wood fiber for the forest industry, and act as CO<sub>2</sub> sinks as the trees grow. In Guilan, hundreds of hectares of poplar plantations are currently being established each year on previously agricultural and logged forest sites. These sites are generally under naturally regenerating *Populus caspica* before clearing is done to establish plantation. Site preparation includes brush-cutting and disking a year before planting. Information is needed to develop management recommendations for such sites, so that production can be optimized while ensuring that long-term site fertility is maintained. Data from operational-scale planting are particularly needed.

### Research question

How do poplar plantations on forest soils affect soil quality, compared to natural systems?



Study site before poplar plantation



Study site after poplar plantation

### Treatments and replication

Three replications and Four poplar clone:  
1. *Populus euramericana*-214  
2. *Populus euramericana*-45/51  
3. *Populus deltoides*-77/51  
4. *Populus deltoides*-69/55

### Monitoring

We monitor soil from a central sampling area (approx. 25 m\*25 m) within each plot.

- Soil pH
- Nutrient availability (Standard soil test)

### Results

- ♦ Different poplars clones have significant effect on soil parameters
- ♦ The phosphorous, potassium, magnesium and organic matter contents in the upper layers varied in each plot
- ♦ The rates of nitrogen and calcium did not Change between plots.
- ♦ *Populus euramericana* 45/51 had greater positive effects on the soil quality than other clones