

# DEVELOPMENT OF MIXED WINDBREAK FOREST IN NORTH PART OF XINJIANG UIGHUR AUTONOMOUS

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## 1. BACKGROUND AND STUDY SITE

Desertification is one of the serious environmental problems today all over the world. The study site is Altay area, north part of Xinjiang Uighur autonomous in China. Kazak people live nomadic life in the area. Ecosystem deterioration due to overgrazing became great concern. It is important to establish sustainable nomadic cycle to solve this problem. Local government promotes domiciling nomads and developing farmland for them. The annual precipitation of about 200mm is not enough to produce crops, so irrigation is necessary for success in agricultural production. In spring and fall, strong wind with a wind speed of 20m/s or more often blow. Therefore it is common to plant trees around agricultural lands.

The subject of this research is the development of the windbreak forest in the two agricultural lands developed by Japanese research project team. People in this area usually use a great amount of black poplar (*Populus nigra*) nowadays. But it seems better to plant various kind of trees because mixed windbreak forests exert a positive influence on local environment. The purposes of this research were to know more about each kind of trees and to explore the best ways to make good use of them.

## 2. METHODS

Firstly, tree species, size of trees and leaf area index (LAI) of the existing windbreak forest were recorded.

Then, eight kinds of seedlings were planted in the irrigated project field, and their water conditions were measured.

Additionally, the survival rate and the size of the trees in the windbreak forest, planted in fall 2002 and spring 2003 around an irrigated and a no-irrigated fields were measured.

## 3. RESULTS AND DISCUSSION

In this area, they plant shrubs with thorn at the outside of tall trees such as poplar to guard products and trees from feeding damage by sheep. Many species were used for the windbreak forest of the 1970s. The windbreak forest of only one or two kind of trees tended to show less LAI than the forest with various species. Planting limited kinds of trees is not good for effective water use. Multilayer windbreak forests excel in many aspects such as windbreak performance and biodiversity. It would be better to accelerate the conversion of poplar forests to mixed forests.

Sap flow measurement of tall salicaceous trees showed that sap flow rate per leaf area of black poplar (*Populus nigra*) was less than that of *Populus euphratica* and *Salix pyrolaefolia*. *Populus euphratica* is local poplar in Xingjiang, and natural *Salix pyrolaefolia* grows in mountainous land. It was estimated that black poplar suppressed transpiration because of water stress.

Survival rate of black poplar in the irrigated field was almost 100%. In contrast, in the field without irrigation, almost all of the tall trees were dead. However, shrubs such as Russian-olive (*Elaeagnus angustifolia*) and tamarisk (*Tamarix ramosissima*) showed high survival rates compared with the other species. These species corresponded to the species with low water potential. They showed the capability to survive in arid condition. Several protected species in Xinjiang have declined because of reckless deforestation of fuelwood forest. It is meaningful to use native species for their conservation.

Further investigations such as planting intervals, windbreak performance and density management are needed.