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The Functional Assessment of Tree Windbreaks in Khorezm, Uzbekistan, Aral Sea Basin

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Abstract

In Uzbekistan, over 50 % of farmland suffers from wind erosion; about 80 t/ha of topsoil are lost to wind each year. Winds also decrease land surface humidity, scatter seeds and sandblast fields. Windbreaks positively affect microclimatic change, and protect neighbouring fields. Strong winds can lose about 50–80 % of their velocity passing through optimally designed tree strips. Consequently, air humidity raises 3–20 % while the air temperature drops by two-three degrees Celsius allowing for yield increases by 10–20 %. In 1966–1992, tree windbreaks were planted on about 40,000 ha of agricultural land in Uzbekistan. After 1992, this practice almost completely ceased, due to a change in priority setting after Uzbek independence. Today, many old windbreaks are cut down or die due to a lack of care. Well-designed and maintained windbreaks to combat erosion need to be re-established. First an inventory was conducted using remote sensing techniques on the occurrence and structure of tree windbreaks along two transects in Khorezm, a region in Uzbekistan closely located to the Aral Sea. We identified more than 2300 tree strips stretching over a total of 700 km in the cropland area of 39 thousand hectares of these two transects. The land covered with tree strips amounted to 450 ha (about 1 %) which is lower than the nationally recommended minimum of 1.5 %. We analysed these windbreaks based on recommendations for an optimal windbreak design. Results showed that:

- Monospecific mulberry strips (*Morus spp.*) comprised 50 % of windbreaks;
- Only 70 % of the windbreaks were oriented in the NS and NW-SE directions, the desirable direction since the highest speeds (>3 m/s) are generally prevailing from E and NE;
- The majority of the investigated tree strips did not satisfy the minimal height of 5 m; other structural criteria like stand porosity, length and width had acceptable values.

This study revealed the existence of numerous windbreaks in a dryland region where generally trees are not expected; however, their structure and layout must be improved to gain the expected efficiency and can contribute to combat an advancing land degradation.

Keywords: Assessment, farmlands, remote sensing , wind erosion, windbreaks

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