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## The Comparative Advantage of Conservation Agriculture in Wheat and Cotton Rotation in the Khorezm Region, Aral Sea Basin

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### Abstract

The arable land of Uzbekistan is slowly but steadily deteriorating due to erosion, soil salinity and unsustainable management practices. Water scarcity together with the concurrent shallow groundwater tables are perceived by farmers as major bottlenecks. Sustainable agricultural practices must be developed that increase productivity and improve resource use efficiency. However, measures aiming at improving the ecological conditions cannot be implemented at the expense of the farmers' economic benefits. One promising avenue is the use of soil conservation (SC) practices. We studied the effect of SC agriculture on key environment indicators and on financial gains in Khorezm region in Northwestern Uzbekistan. A long-term field experiment was established on a typical farm-size operational scale (7 ha) on two different soil textures. Cotton and winter wheat production were studied (2004–2005) under four tillage systems: conventional, intermediate (reduced number of tillage operations on the field), permanent bed, zero tillage (no-till). At each of these treatments, the effect of surface mulch was also studied. The development and yield of crops, and also the soil improvement (indicated by soil bulk density, increase in water infiltration capacity, improved organic matter and nutrient availability) were significantly better with the bed-planting system than with planting on flat soil (conventional), especially on the heavy loamy soil. The highest cotton yield was obtained with the intermediate tillage system. The mulch effect was already significant at germination and the initial stage of the crop development; in the end, crop residue cover increased yields of both cotton and wheat significantly irrespective of the tillage system. Water consumption was least with the conservation systems. A financial evaluation showed that permanent bed or intermediate tillage systems had 25–30% higher gross margins than conventional tillage caused in particular by higher yields, less labour and machinery costs methods. The adaptations of research made the use of SC agriculture principles possible and will improve farmer's profit and livelihood.

**Keywords:** Crop residue, financial evaluation, gross margin, no-till, permanent beds, soil conservation