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Optimising Cotton (*Gossypium Hirsutum* L.) Fertilisation in the Irrigated Agriculture of the Aral Sea Basin in Uzbekistan

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Abstract

Cotton (*Gossypium hirsutum* L.) had and still has a central role in Uzbekistan's economic development. Up until now, cotton is grown as state order crop where production targets are set by the government. Due to heavy input subsidies during Soviet times, unsustainable agricultural practices like over-use of fertilisers was common, and farmers had no incentives to efficiently use fertilisers, pay attention to losses to the environment, or consider cost-effectiveness of their management.

Given the on-going reforms after independence, i.e. increasing privatisation, farmers need adapted fertiliser management recommendations. Most fertility research conducted by the Uzbek Cotton Research Institutes, however, aimed at maximising cotton production. The last update occurred before independence and did not consider factors such as cotton quality and cost-effectiveness of fertiliser use. As a result, the former fertiliser recommendations do not meet the new economic demands.

Therefore, the response of irrigated cotton to different N, P and K-fertiliser rates was studied on a slightly saline soil in Khorezm region, in North-western Uzbekistan. Cotton yield, quality, nutrient balances and the economic feasibility of fertilisation rates were determined. Results showed that higher NPK rates and balanced proportions of N:P:K increased cotton yields while concurrently improving its seed and fibre quality. The quality depended highly on the time of picking and showed an optimum at the first pick. However, higher application rates negatively affected potential income of farmers. An increase in fertiliser rate increased total yield and profits but also delayed the opening of cotton-balls, which then did not coincide any more with the period when the highest cotton price was offered by the ginneries. Hence, the rate of return to investments was highest for lower fertilisation rates.

The findings suggest that the present fertiliser recommendations are inadequate for increasing the yield and quality of Uzbek cotton and simultaneously increasing farmers' income and livelihood. Instead, recommendation windows should be implemented which allow to consider various aspects, and on which private farmers can make their own decisions depending on their priorities and interests.

Keywords: Cotton, fertiliser, quality, rate of return, yield