



Improving arid land by establishing pistachio plantations

AGROECOSYSTEM:
Irrigated and Rainfed



BENEFITS

- Improves productivity of arid land
- Rehabilitates arid land in hilly areas
- More profitable than livestock production
- Prevents compaction of pastures caused by overgrazing
- Improved food diversity

Creating pistachio plantations on gentle slopes helps to improve productivity, prevent soil compaction, and rehabilitate arid lands in hilly areas.

APPLICATION

Uzbekistan has around 400,000 ha of adyr (hilly) lands, much of which is on the verge of desertification as a result of population pressure and unsustainable land use practices. These foothills are currently mostly used as pastures and as rain-fed cropland for winter wheat. However, with low levels of rainfall, the production of rain-fed wheat is unsustainable and rarely exceeds 8–10 centners/ha (usually 3–5 centners/ha). This is sometimes not enough to cover the cost of the seed grain. Overgrazing of these areas can also lead to degradation of rangelands.

Pistachio is a highly drought-resistant tree species. Unlike many other fruit-bearing species, it is able to successfully

grow and produce high-quality yields in arid conditions where other species cannot grow without artificial irrigation. The average productivity of pistachio is around 10 centners/ha and trees can live for more than 1000 years.

Briar planted along the fence bears fruit for 20–25 years, providing a supplementary source of income. Crops planted in the inter-row spaces partially compensate for the initial investment in the technology and also improve the soil.

Following traditional soil preparation (including tilling and sub-soiling), planting positions for the pistachios are marked out with pegs, in accordance with a 6 × 8 meter layout (planting density is 208 pcs/ha). To prevent animal

- Semi-arid regions receiving 250–500 mm of rain per year
- An altitude of between 100 and 500 meters above sea level
- Foothills and hilly areas
- Land-use type: Mixed/agroforestry

grazing, the plantation is fenced with barbed wire on wooden poles and the planting of briar. In 2–3 years, the briar becomes a live fence, and the barbed wire can be re-used elsewhere.

Post-planting watering is performed at a rate of 1.5–2 liters/plant. During the three months of summer, irrigation is carried out 3–5 times a month using a simple drip technique with plastic bottles. Areas that receive some rain (300–500 mm/year) are only irrigated for the first two years. It can take pistachios eight years to become productive, so during this time the inter-row spaces in the plantation are used for growing tilled drought-resistant field crops such as safflower, peas, melons, gourds, and alfalfa. Alfalfa is particularly important for improving soil properties (structure and organic matter formation, nitrogen fixation, etc.).

Mineral fertilizers are applied: 290 kg/ha of ammonium nitrate (N 33–34.5%) and 220 kg/ha of superphosphate (P 45%).



Pistachio trees help to improve productivity and rehabilitate arid land in hilly areas

Grafting with the selected variety is performed 3–4 years after planting to stimulate early fruiting. This grafting process is responsible for the majority of the costs associated with growing pistachio, although cost is also affected by the distance between the farming enterprise and both the sources of irrigation water

and transportation costs. However, due to economies of scale, increasing the area would reduce the cost per hectare of creating the plantation. The cost is minimal (45% of the total amount) when the plantation area is 20 ha. Running costs also decrease as the trees age.

MITIGATION STRATEGIES

- It may take up to 10 years to achieve profitability. Solution: to grow inter-row crops before the pistachio trees become productive.
- Insufficient funds for long-term investment. Solution: providing micro-loans or other forms of financial assistance to farmers who want to invest in pistachio orchards.
- Expensive technology is required in the initial stages (for purchase of seedlings, irrigation, etc.). Solution: government assistance may be needed.

CACILM Factsheets

These factsheets are designed to promote proven and sustainable interventions to improve land management in Central Asia. The technologies and interventions highlighted are generated by the IFAD-funded project on Knowledge Management in Central Asian Countries Initiative on Land Management. The initiative's Knowledge Platform, managed by ICARDA, aims to disseminate solutions to rehabilitate and prevent the further degradation of Central Asia's natural resources.

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Contact:

A.Akramkhanov@cgjar.org, Project Coordinator, Knowledge Management in CACILM II

www.cacilm.org

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