Prunus bucharica – wild almond: species status review and action plan for its conservation in Childukhtarom and Dashtijum reserves, Tajikistan

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1. **Species Description**

1.1 Taxonomy

**Family:** Rosaceae  
**Sub-family:** Amygdaloideae  
**Genus:** Amygdalus

*Prunus bucharica* (also known as *Amygdalus bucharica*) is a wild almond species found only in Central Asia. It is a relative of 430 other *Prunus* species including different cherries, plums, apricots, peaches and nectarines. Wild almonds are found in a sub-genus of *Amygdalus*, identified by their deeply serrated stones and by the fact that their axillary buds appear in triples (Velasco et al. 2016). The sub-genus *Amygdalus* has about 40 species distributed in the subtropical and temperate zones of the northern hemisphere. There are 5 *Amygdalus* in Tajikistan.

1.2 Status

*P. bucharica* is listed as Vulnerable on the IUCN Red List (due to loss of its habitat throughout Central Asia), but it is not considered a rare species in Tajikistan and is not included in the National Red Book of Tajikistan.

1.3 Biology/ Description

**Form:** *P. bucharica* is a tree that reaches heights of 3 to 10 m and has a trunk diameter of around 30–35 cm. On dry slopes it takes on a bush-like shape. The bark of the old trunks is often cracked and tempera-gray to ash-gray in color. New shoots are hairy or woolly and have a dirty green color, becoming brown by the end of the summer. The buds are elongated, ovoid or round-cone-shaped. They are single on young shoots and appear in groups on perennial shoots.

**Leaves:** Leaves are 6-8 cm long, 2-2.5 cm wide, oblong-tongue-shaped, round at the base, pointed and upturned at the edges. They are short-haired on the edges. Petioles (leaf stalks) are 2.2-2.6 cm long, densely hairy or woolly, rarely smooth. Stipules have fringed edges and are broad at the base and taper gently towards their edge.

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Flowers and fruit: *P. bucharica* blooms from February to March and bears fruit in June and July (Zapregaeva, 1964, Flora of the USSR, Lapin P.I., 1986).

The flowers can be solitary (on last year’s shoots) or found in groups on perennial shortened, flower stalks of 1 - 2 mm in length. The hypanthium (a cup like structure that acts as a base for the petals, sepals and stamens) is 1 cm long and is pink or red. The sepals are triangular, hairy at the edges, completely smooth or hairy. Petals range in colour from light pink to crimson red, are usually not overlapping; in shape they are ovate, oval, obovate or narrowed wedged into a short fingernail with a notch at the apex. The flowers have 23-30 stamens with raspberry red threads.

Fruits are around 4 cm long. The surrounding case (known as a pericarp) is densely hairy, flatly truncated at the base, pointed and unequal at the apex. It cracks into two pieces when ripe. The stone is light brown and glossy. In shape it is laterally compressed, ovate, oblong or almost lanceolate, sometimes saber-like, pointed at the apex and almost always unequal. The core is bitter, although very occasionally tastes sweet.
2. Current Distribution

2.1 Global

*P. bucharica* is endemic to Central Asia along the mountain ranges of Kyrgyzstan, Uzbekistan and Tajikistan. This includes the Western Tien Shan, Kuratin, Turkestan, Malguzar and Nurata and in the Pamiralai (Bioversityinternational.org, 2018).

2.2 Tajikistan

Almonds are one of the main forest-forming species in the mountain forests of Tajikistan and in natural plantations are mainly propagated by seeds (Nimadzhanov K.N., 2016). Wild almond is one of the more common trees across Tajikistan, especially in dry areas in the south of the country. It is found at an altitude of 800-2300 m and is known in the Kondara gorge (on dry southern rocky slopes, (Pavlovsky E.N. et al 1951)), in Varzob gorge (P.N.Ovchinikov, 1971), on the stony small-earthly-gravelly ridges of Darvaz and Hazratisch, in the gorges of Jawzo-Dara and Pahmdara along the slopes in the mountains of Childukhtaron and in the vicinity of Dashtijum (Mario Boboev, 2018).

2.3 Childukhtaron and Dashtijum Reserves

Surveys conducted in the areas of shiblyak and deciduous forests in Childukhtaron found *P. bucharica* in the following places; Javzodara River Valley, Obisur River Valley, Gallakdara and Dikhandoni Poyon Village.

In Dashtijum *P. bucharica* is found on the loam and rocky soil of the Western, Northern and Northwestern part of Dashtijum reserve at the altitude of 880 – 1800 meter above sea level (Mario Boboev, 2018).

3. Functions and values

*P. bucharica* has been grown in large quantities in non-irrigated lands in Tajikistan since 1934 (Lapin, 1964). In Tajikistan *P. bucharica* is one of the most promising tree species for sustainable anti-erosion plantings on mountains slopes. It is very drought tolerant and undemanding and can be grown on gravel and rocky slopes where other trees and shrubs die (as observed in Childukhtaron and Dashtijum). It is also widely used as a drought-resistant root-stock for other species to be grafted on (eg sweet almonds, peaches and plums) and thus is used in mountain rain-fed gardening.

A single *P. bucharica* tree produces 2-3 kg of fruit, which creates valuable goods for local communities to sell to a wider market. The bitter core of almonds contains high amounts of fat and protein and is used as a source of oil for the confectionery industry. It has long been used in folk medicine in the treatment of kidneys, liver, colds, and is used as a diaphoretic and diuretic (Zapryagaeva, 1964; Ikramova, Trofimova, 1964).

The tree also provides strong timber, is valued in carpentry and is also a high-energy firewood used by the local population.

Due to its high polymorphism *P. bucharica* is valued as a genetic resource for use in breeding programs; helping to provide genes for high yields, different maturation schedules and
potential disease resistance.

4. Habitat

Most *P. bucharica* trees are found on southern mountain slopes, in rocky soils at elevations of 800-2300. It is most often found in Shibilak forest with other dry-tolerant species such as *Acer turkestanicum*, *Crataegus turkestanica*, *Padellus mahaleb* and occasionally *Rosa* sp, and in drier and more open areas with *Acer regelii* and *Pistacia vera*. Optimal conditions include hot summers with regular precipitation between 300-700 mm.

5. Threats

The main threats to *P. bucharica* are man-made and include firewood collection and livestock grazing. The species is commonly harvested for firewood in the Childukhtaron and Dashtijum areas. Shrub forms are eaten by cattle, which graze freely both forests. Cattle damage the almond crown, therefore reducing fertility and preventing regeneration through eating and trampling young seedlings. In recent habitat assessments carried out Childukhtaron and Dashtijum by partners from Kulob Botanic Garden, in all survey plots there were signs of poor tree health, with many branches drying. Out of the 18 survey plots, seedlings were observed in just four plots, providing further evidence that grazing is reducing natural regeneration. Intensive grazing pressure also weakens the trees, making them more susceptible to pests and disease.

Little is known about pests and diseases impacting almond trees, although there is some evidence that a native silk moth *Malacosoma parallela* can cause extensive damage to almond plantations (e.g. Sangov (2011) estimated that at altitudes of 1200-1500 m, up to 80% of almond trees in the Hissar mountains (Uzbekistan-Tajikistan) can be affected, though at 2300 m, less than 15% of trees were affected). Impacts from *M. parallela* alone are quite difficult to quantify and it’s not clear if wild trees – in comparison to plantation trees – are badly affected or not.

6. Climate Change

The IPCC predicts an average increase in surface air temperature in Central Asia to 3.38 °C by 2050, indicating a significant impact of climate change and global warming (Parry et al., 2007). Consequently, an increase in extreme weather events such as frost, heat waves, droughts and heavy rainfall is expected. Almond trees generally thrive in hot and dry conditions and do well in poor soils. It’s possible that the species will do well as the temperature increases and the summers become drier, although heavier snow or rain fall in the spring months could negatively impact this species.

7. Conservation

As part of the Global Trees Campaign, FFI is working with its local partners in Tajikistan to help address the threats faced by *P. bucharica* and ensure the long-term conservation of this vulnerable species.
Work is underway to directly protect the species, to conserve its habitat and also to provide incentives to local people to support species conservation and sustainable forest management.

**Species-specific actions** have so far focused on reinforcement planting of *P. bucharica*, with more than 23,100 trees planted in Childukhtaron and Dashtijum reserves. More than 31,900 *P. bucharica* trees have also been planted in local nurseries in Childukhtaron and Dashtijum where they are being cared for ahead of future planting events.

**Actions to protect and restore the species habitat** include the development of a Participatory Management Plan (PMP) for Dashtijum (completed in 2019) and Childukhtaron reserves (under development) in Tajikistan. Each PMP is jointly compiled by the forest reserve’s staff and the community (stakeholders) to jointly take part in the managing the reserve and solving its problems. The PMP will act as an official document and a guideline for managing the reserves in Dashtijum and Childukhtaron. Based on that document, 6 key zones have been identified and demarcated in Dashtijum’s reserve to identify important areas for endangered tree species (including *P. bucharica*). These areas will be prioritized for further monitoring and action (e.g. protection and restoration) in these areas. With support from the Darwin Initiative, the project will plant out 400,000 native tree species (from multiple species) across Childukhtaron and Dashtijum reserves (helping to restore large areas of fruit and nut habitat).

**Community engagement.** With support from the Darwin Initiative, FFI and local partner Zam Zam is also working with local communities to help people gain economic value from the species and other fruit trees. This has been delivered through a process called PMSD (Participatory Market System Development), a series of activities that has helped the local community to identify and address factors that limit their participation in local markets and also add value to the fruits they sell. Training and equipment needed to produce higher quality dried fruit was provided, and communities are now selling pear and fruit products at a higher price. This is helping people in local communities to perceive and realize economic value of the collected fruits from these trees. This is particularly relevant for wild almond trees, as fruit harvested from wild trees has a strong export market, and there is real potential for local communities to secure increased income from sale of this species.

FFI has also carried out a number of educational and cultural activities to celebrate the fruit and nut forests and the harvest they provided. This has been carried out in partnership with Kulob Botanic Gardens and previously with local NGO Zan va Zamin.

### 8. Specific recommendations for future conservation actions

- Complete a resource assessment of wild almonds in both Childukhtaron and Dashtijum Reserves. This would give an accurate estimate of the population size of the species in these reserves, and would also provide an estimate of the total amount of fruit produced by the species each year. This is vital to help inform guidelines for the sustainable use of the species.
- Based on result of resource assessment, train FSU staff and local plotholders to monitor wild almond populations and harvest levels, to ensure that future harvest is within sustainable limits.
- Monitor whether pests and diseases are impacting wild populations of native trees including *P. bucharica*. If necessary, carry out actions to control pests and diseases and ensure measures are in place to reduce spread of diseases between wild trees.
- Protected almond habitat from grazing. Further fencing, in strategic areas, is needed to increase regeneration on a bigger scale. Important habitat areas for wild almond in each reserve include Javzodara River Valley, Obisur River Valley, Gallakdara and Dikhandoni Poyon Village in Childukhtaron and in Western, Northern and Northwestern parts of Dashtijum reserve, at an altitude of 880 – 1800m.
- Encourage seed collection from as many different almond trees as possible. This will maximize genetic diversity in seedlings grown by the FSUs.
- Increase the spread of the almonds throughout the nature reserves, through planting in at least six different areas.
- Continue to build local pride and awareness in the almond trees. The species is endemic to Central Asia and is found in few other places in the world. It’s really special and unique that they survive in these areas in Tajikistan.
- Implement Participatory Management Plans for Childukhtaron and Dashtijum reserves to help support general protection and regeneration of the forest. Wherever possible, ensure almonds benefit from this approach by targeting planting and protection in priority areas for almonds.
- Continue to implement Participatory Market System Development Action Plans. This is key to helping local people gain benefits from sustainable harvest of fruits and nuts from the forest, and helps to create incentives for sustainable management of the forest and its habitat.
- Collect and document traditional knowledge of the local community regarding the use of wild almond for human and wildlife and develop the guidelines for its restoration and planting.
- Conduct further research and assessments on the impacts of climate change on this species.

9. Literature


Komarov V.L. Materials on the flora of Turkestan highlands. The pool of Zeravshan. Trofimova , 1964


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