



## Dryland Systems Solutions

Producing More with Less

### Pastoral and Agro-Pastoral Systems

# Managing rangelands: promoting sustainable tree species

***Acacia modesta*: A frost-resistant and drought-tolerant tree ideal for alleviating feed shortages and feeding costs**

Climate change and intensive grazing due to increasing livestock numbers are severely affecting arid and semi-arid rangelands. In an attempt to support local communities highly dependent on livestock, ICARDA is encouraging the use of drought-tolerant trees, shrubs and grasses with a view to protect limited water resources and develop sustainable grazing.

*Acacia modesta*, commonly known as Phulai, is a member of the family Fabaceae (also called Leguminosae) and sub-family Mimosaceae. It is a deciduous, slow-growing small tree with thorny young shoots and dark brown and black wood. In natural forests, the trees have a 30-year felling cycle and 60-year rotation period on reaching 7 m height and 20 cm diameter.

This drought-tolerant tree is typically found in Pakistan, India, and Afghanistan, where it can grow in areas with a yearly rainfall between 250 and 1300 mm. Well adapted to semi-arid and sub-humid regions, *Acacia modesta* prefers temperatures ranging from -5°C to 40°C and exhibits some resistance to frost. So far, no insect or disease problems have been identified, granting this tree great potential to be used in reforestation in dry and arid locations.

In drylands, *Acacia modesta* is an important forage species. Tender leaves and twigs in particular have a high nutritional value and palatability, and are used as fodder for goats and camels. With around 16% protein levels, young shoots are typically used to supplement grass during the dry season. For livestock, this mixture is ideal to improve nutrient utilization and increase weight gain.

The plant is also popular in herbal medicines, including those for the treatment of muscular conditions, back pain, and stomach problems. Other uses include fuel, wood, apiculture, gum, and soil conservation.



**Scientific name:**

*Acacia modesta*

**Common names:** Phulai, Palosa.

**Location:** The tree is native to the foothill ranges of the Himalayas, Salt Range, Sulaiman Hills, Balochistan, and Kirthar Range.

### ***Acacia modesta* Benefits:**

- Drought-tolerant.
- Moderately resistant to frost.
- Grows in many different soils, including dry shallow soils.
- Adapts to a wide range of temperatures, from -5°C to 40°C.
- Highly nutritious fodder for goats and camels.



Flowering stage of *A. modesta*



Natural habitat of *A. modesta*, Chakwal district, Punjab province, Pakistan



Goats browsing *A. modesta*

## Establishment and management

*Acacia modesta* can be propagated through seed. Clean seed must be stored in a cool dry place, ideally in airtight containers to avoid excessive losses in germination rates. It can safely be kept in these conditions for up to three years. Fresh seeds can be sown as they are, but if using older seeds a pre-treatment to facilitate germination is recommended. This may involve nicking the seeds to remove the outer coat and/or soaking in water for 24 hours or sulfuric acid for 5 to 15 minutes. Treated seeds should be planted immediately.

For planting, the best method is to sow seeds in nursery conditions in polythene tubes containing a 2:1 silt and manure mixture. Seeds start to germinate within 1 to 2 weeks, but should only be transplanted to the field after 9 to 12 months. Very young plants need to be protected from grazing.

The same tree can be harvested multiple times taking advantage of its ability to re-grow new shoots from buds left in the stumps of felled trees. This traditional silvicultural method – coppice system – is very common in extensive drylands.

In terms of nutritional value, digestibility values range between 60% and 70%, depending on the type of soil and age of the plant. Typical values include 16.2% crude protein, 22.8% crude fiber, 8.1% ash, 2.1% ether extract, and 50.7% nitrogen free extract.

### Effective Maintenance:

- Store seeds in airtight containers in a cool dry place
- Plant seeds in polythene tubes with silt and manure in a 2:1 ratio
- Before planting, pre-treat old seeds by nicking and/or soaking in water for 24 hours or in sulfuric acid for 5 to 15 minutes
- Transfer saplings to the field about 9 to 12 months after planting
- Maximize forage production by managing forest in a coppice system.

## Rangeland factsheets:

This series of flyers is designed to build awareness of sustainable rangeland management through best practices and well-adapted species among extension workers and those working in the agricultural research and policy sector.

## ICARDA's Rangeland Ecology and Management Unit

ICARDA's Rangeland Ecology and Management Unit aims to address the unsustainable use of resources induced by mismanagement, the adverse effects of climate change, and an increasing demand for food and feed in the dry areas. ICARDA programs promote the enhanced quality and productivity of crop, forage, and livestock, and the improved management of water resources through close cooperation with farmers and national researchers.



### Contact:

Dr Imtiaz Ahmad Qamar, Director, Rangeland Research Institute, National Agricultural Research Center Islamabad. [iaqamar@hotmail.com](mailto:iaqamar@hotmail.com)

Dr. Muhammad Islam, Small Ruminant Production Scientist, ICARDA Pakistan. [mu.islam@cgiar.org](mailto:mu.islam@cgiar.org)

Dr. Kathryn Clifton, Postdoctoral Fellow in Landscape Ecology. ICARDA. [K.Clifton@cgiar.org](mailto:K.Clifton@cgiar.org)

Dr. Mounir Louhaichi, ICARDA Range Ecology and Management Research Scientist. [M.Louhaichi@cgiar.org](mailto:M.Louhaichi@cgiar.org)