

A more practical example comes from Karnataka, India. In 2025, it was reported that nearly 3 000 farmers in the drought-prone regions of Dharwad and Haveri introduced millet crops into degraded lands after long-term drought with support from the CROPS4HD project. The cultivation area expanded from about 50 acres to more than 2 000 acres across 23 villages, and a farmer producer company with around 5 000 members was established. The project promoted several millet crops, including proso millet, and reduced farmers' risks through seed supply, technical training, and market access support.

Agriculture on marginal lands is not only about crop stress resistance, but also about seed supply, technical services, farmer organizations, and market outlets. If proso millet is to be widely promoted in saline, drought-prone, and low-fertility areas, it should be integrated with crop rotation systems, cooperative organizations, contract purchasing, and functional food development, rather than being planted only as a scattered minor grain crop.

6.3 Proso millet as a functional feed resource

Proso millet also has strong agricultural potential as a feed resource. Unlike crops used only for grain production, proso millet can be used as silage or harvested forage and is suitable for dry regions, short growing seasons, and low-input crop-livestock farming systems. Research on forage production, feeding value, and silage suitability compared proso millet with whole-crop maize and Sudan grass hybrids (Wei et al., 2022). Although the fresh forage yield of proso millet was lower than that of maize and Sudan grass hybrids, its relative feed value was higher than that of Sudan grass hybrids. In addition, proso millet has a short growth cycle and rapid growth rate, making it an alternative forage resource in low-input regions.

The study also dynamically monitored the silage fermentation process by measuring fermentation quality on days 1, 2, 3, 5, 10, 15, 20, 30, and 45 after ensiling. During the fermentation process, lactic acid and acetic acid contents increased, while pH rapidly declined in the early stage and then became stable. However, the dry matter loss of proso millet was relatively high, indicating that harvesting time, moisture content, and silage additives still need optimization when using proso millet as a silage crop.

Therefore, the feed application of proso millet should not only emphasize that it “can be used as feed,” but should further distinguish four utilization pathways: grain feed, fresh forage, hay, and silage. In saline and drought-prone areas, proso millet can be rotated or intercropped with legume forages or feed legumes to improve protein supply and soil nitrogen cycling. In integrated crop-livestock farming systems, millet grain, straw, and processing by-products can be utilized together to form a “grain-feed-livestock-fertilizer” recycling model. This dual-purpose utilization capacity can provide farmers with greater flexibility when facing grain price fluctuations, feed costs, and climate risks.

6.4 Contribution to food security and sustainable development

The contribution of proso millet to food security is mainly reflected in three aspects. First, it expands the boundaries of food production on marginal lands. Second, it increases cereal diversity and dietary diversity. Third, it provides a crop foundation for low-input, low-water-consumption, and climate-adaptive agriculture. Millet crops possess strong climate resilience, high nutritional value, and significant rural economic potential, and they are expected to play a greater role in global food security and sustainable food systems in the future (Sharma et al., 2025).

After the “International Year of Millets” in 2023, millet crops were further incorporated into discussions on nutritional security, climate adaptation, and sustainable agriculture. Millets can help reduce dependence on high-input agricultural systems and are closely related to the United Nations Sustainable Development Goals, including zero hunger, climate action, and poverty reduction. In addition, the industrialization of millet cultivation and processing may create income opportunities for rural communities (Mohan et al., 2025).

For proso millet, this value is especially important. It is neither simply a famine-relief crop nor just a traditional minor grain for local diets. Instead, it is a multifunctional crop that can connect saline-alkali land utilization,