

Knowledge Paper: Olive Under PQNK — Pakistan's Underdeveloped Potential



Executive Summary

Pakistan imports the entirety of its olive oil, approximately 15,000 to 20,000 tonnes annually, despite holding significant areas of climate-suitable land across the Potohar plateau, the Khyber Pakhtunkhwa hills, and the Balochistan highlands where olive cultivation has already been demonstrated to be agronomically feasible. The barrier to commercial olive development in Pakistan has never been climate or soil suitability. It has been the capital cost of establishment and the long, unproductive wait before a conventionally managed olive orchard reaches economic production. This paper sets out how PQNK removes that barrier: a rainfed water-harvesting technique purpose-built for sloping, non-irrigated terrain, and a set of PQNK's standard biological management principles, applied to a tree crop whose Mediterranean origin already predisposes it to thrive once soil biology is restored.

1. The Opportunity: A Crop Pakistan Already Needs

Olive is not a speculative or experimental crop for Pakistan. It is a crop the country already depends on entirely through imports, at a scale, 15,000–20,000 tonnes of oil a year, that represents a persistent foreign exchange outflow. Commercial-grade olive cultivation has already been shown to be viable in the Potohar plateau, the hill districts of Khyber Pakhtunkhwa, and parts of the Balochistan highlands. What has been missing is not agronomic possibility but an establishment pathway affordable enough, and fast enough to profitability, for ordinary growers to adopt at scale. PQNK is built to close exactly that gap.

2. The Curved Furrow and Borehole System: Rainfed Water Management

For olive grown on rainfed, sloping land, where installing irrigation infrastructure is either impractical or economically unjustifiable, PQNK applies a technique adapted specifically to non-irrigated terrain: the curved furrow and borehole system.

A curved furrow is cut on the downhill side of each tree, positioned to intercept rainfall runoff before it escapes the root zone. That furrow channels the intercepted water into a dedicated borehole, one foot in diameter and four feet deep, sunk beside the tree to act as a high-capacity infiltration reservoir.

Rather than allowing rain to run off the surface and away from the tree, as happens on bare or compacted conventional orchard soil, the borehole holds the intercepted water and lets it percolate slowly into the surrounding profile, charging the deeper root zone that a mature olive tree's roots are able to reach. Combined with a thick surface mulch layer, which captures dew and atmospheric humidity in addition to shielding the soil from direct evaporation, this system is reported to make an established olive tree self-sufficient from rainfall alone in regions receiving as little as four hundred millimetres of rain annually.

Design: One curved furrow per tree, directing runoff to a dedicated 1 ft diameter x 4 ft deep infiltration borehole

Reported viability threshold: Self-sufficient from rainfall alone at annual rainfall as low as 400mm, once established

3. Why Olive Responds Well to PQNK Soil Biology

Olive's Mediterranean habitat of origin already makes it an inherently drought-tolerant species. What conventional cultivation in Pakistan has not been able to supply is the biologically functioning subsoil that lets that inherent drought tolerance actually express itself in the field. PQNK's restored capillary function in the subsoil, the product of permanent raised beds, mulch management, and undisturbed soil biology rather than any olive-specific technique, is reported to provide adequate root-zone moisture in all but the driest periods, without the fertiliser or irrigation inputs conventional olive establishment depends on.

The same biological nitrogen supply and mineral delivery system that PQNK applies across every crop in the system is reported to eliminate the fertiliser cost of olive establishment. And the under-canopy diversity that a PQNK orchard maintains, rather than the bare-floor management typical of conventional groves, is reported to provide the year-round predator habitat that manages olive fruit fly (*Bactrocera oleae*) without the insecticide programme that conventional olive orchards require.

4. Reported Field Outcomes

PQNK olive farmers in the Potohar plateau who have established orchards under the protocol report establishment costs 40 to 50 percent lower than conventional olive establishment, with comparable time-to-production and measurably higher fruit oil content. That higher oil content is attributed to the potassium-rich nutritional profile that PQNK's mycorrhizal delivery system provides, the same delivery mechanism reported to drive sucrose accumulation in PQNK sugarcane and Brix levels in PQNK fruit crops.

Establishment cost: Reported 40–50% lower than conventional olive orchard establishment

Time to production: Reported comparable to conventional olive establishment

Oil content: Reported higher, attributed to potassium-rich mycorrhizal nutrition

Fruit fly (*Bactrocera oleae*) management: Reported biological, without insecticide, by the second season in established orchards

5. The Strategic Picture

Pakistan's domestic olive oil production is still in its infancy. The country currently imports its extra-virgin olive oil from origins including Spain, Italy, and Turkey. Every tonne of that import that domestic cultivation could displace, and eventually export, represents a trade balance correction achieved through biological restoration rather than new capital-intensive infrastructure. PQNK's contribution to that picture is not a new olive variety or a new chemical input. It is an establishment

and management pathway that makes the crop's underlying viability in Pakistan's soils accessible to ordinary growers at a cost and timeline that conventional cultivation cannot yet match.

Key Takeaways

- Pakistan imports all of its olive oil, roughly 15,000–20,000 tonnes a year, despite having climate-suitable land in the Potohar plateau, KP hills, and Balochistan highlands.
- The barrier to commercial olive in Pakistan has been establishment cost and time-to-production, not climate or soil suitability.
- The curved furrow and borehole system (a 1 ft x 4 ft infiltration borehole per tree) is PQNK's rainfed water-harvesting technique for sloping, non-irrigated olive land.
- Combined with mulch, this system is reported to make an established olive tree self-sufficient from rainfall alone at as little as 400mm of annual rainfall.
- PQNK's restored subsoil capillary function, biological nitrogen supply, and under-canopy predator habitat are reported to remove the irrigation, fertiliser, and insecticide costs of conventional olive establishment.
- Growers in the Potohar plateau report 40–50% lower establishment costs, comparable time-to-production, and higher fruit oil content versus conventional olive orchards.
- Olive fruit fly (*Bactrocera oleae*) is reported to be managed biologically, without insecticide, by the second season.
- Domestic olive oil production under PQNK is positioned as an import-substitution and future export opportunity for Pakistan.