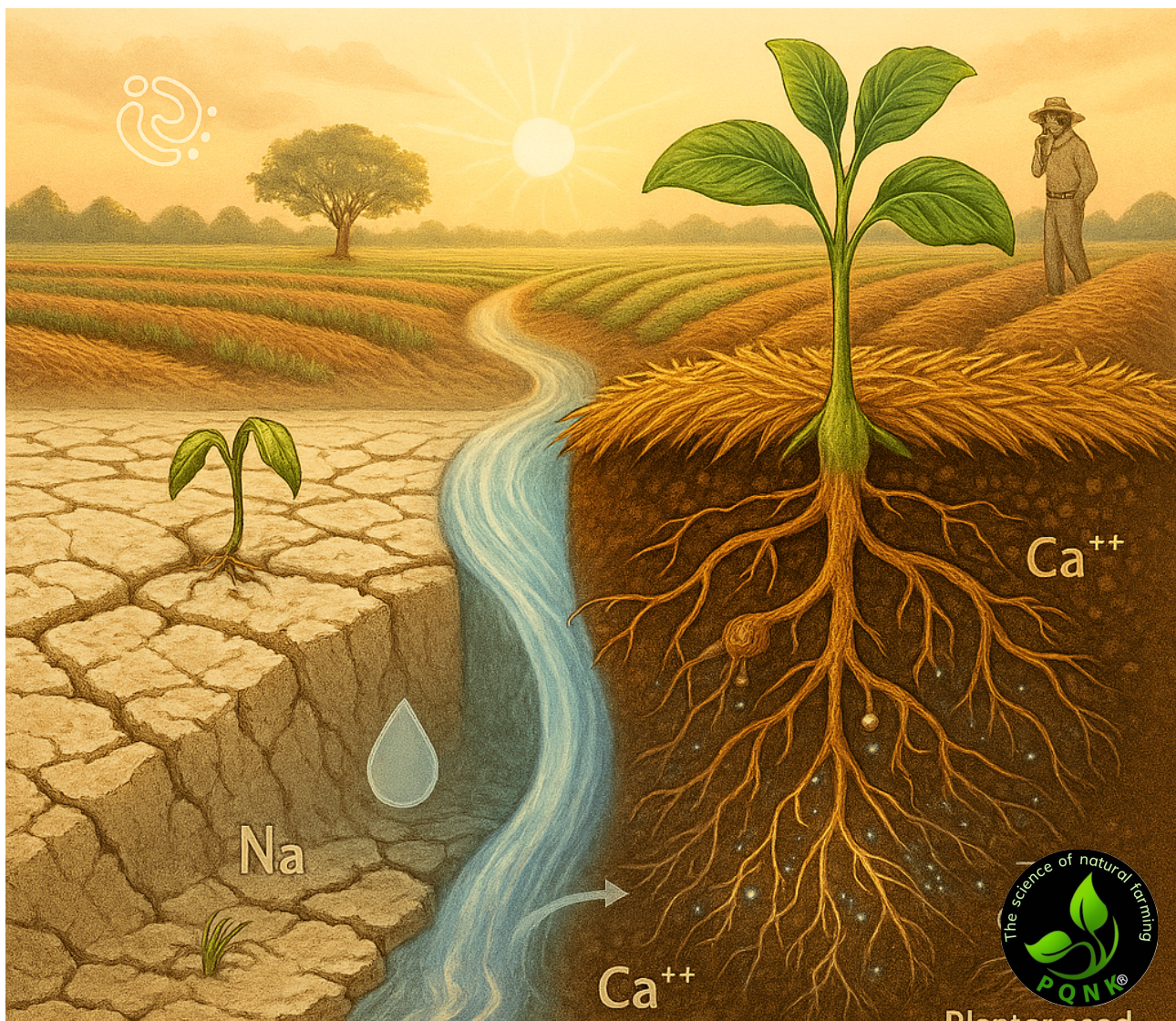


PQNK KNOWLEDGE & ADVISORY PAPER: Managing Saline Irrigation Water & Soil Reclamation through PQNK - the Ecosystem Science



1. Introduction & Core Philosophy

Paedar Qudratti Nizam Kashatqari (PQNK) is a regenerative farming system that restores the soil's natural biological capacity to manage water and minerals. It shifts agriculture from a chemical and drainage-dependent model to a biology-based infiltration and cycling model. This paper addresses a common dilemma in arid regions: whether to use available high-TDS groundwater (6000 ppm) to leach salts from alkaline soil (>pH 8) and when to instead rely entirely on biological reclamation.

2. Understanding the Challenge

- **Saline Water:** 6000 ppm water contains ~6 kg of dissolved salts per cubic meter.
- **Alkaline Soil:** pH 8 indicates calcareous conditions, often with poor structure and salt accumulation.
- **Standard PQNK Approach:** Add sulfuric acid and leach with large water volumes, where water is below 2000 ppm.
- **PQNK Inquiry:** Will this add more salts or remove them? Is water washing always necessary?

3. The PQNK Perspective: Two Distinct Objectives

A. Initial Reclamation (First Season – Cover Crop Establishment)

Goal: Break hardpan, initiate biology, and begin salt management.

Options:

1. **Water Wash + Acid:** Only if specific conditions met (see Table 1).
2. **Direct Biological Planting:** Skip leaching, plant salt-tolerant cover crop (e.g., Jantar) with minimal irrigation.

B. Transition & Maintenance Cropping

Goal: Grow crops with radically reduced irrigation (up to 90% less water than conventional).

PQNK Reality: Once soil life is restored, crops derive moisture from stored rainwater, dew, and air humidity. Irrigation is only occasionally supplemental.

4. Decision Framework: To Leach or Not to Leach?

Water Wash Advisory Based on Water TDS & Soil pH				
Water TDS (ppm)	Soil pH	Soil Condition	Recommended Action for Reclamation Phase	Expected Outcome
< 1200	Any	All	Leaching possible if drainage adequate	Safe salt reduction
1200–3000	< 8.0	Non-calcareous, saline	Avoid leaching; go biological	Prevents additional salt loading
1200–3000	≥ 8.0	Calcareous, sodic	Leach with acid if drainage verified	pH reduction, improved structure, partial salt removal
3000–6000	< 8.0	All	Do not leach; biological path only	High salt addition risk
3000–6000	8.0–8.5	Sodic, calcareous	Leach only with very high volume + calculated acid	Possible reclamation if leaching fraction >30%
> 6000	Any	All	Do not use for leaching	Net salt addition almost certain

Table 1: Water Wash Advisory Based on Water TDS & Soil pH

Key Conclusion for the Farmer:

With 6000 ppm water and pH 8 soil, water washing is not recommended unless excellent subsurface drainage exists and enormous water volumes can be applied. Even then, the net salt balance is risky.

PQNK recommends skipping water wash and proceeding directly to biological reclamation with Jantar.

5. Step-by-Step PQNK Reclamation Protocol (Without Water Wash)

When water washing is omitted, follow this sequence:

1. **Land Formation:** Level land in flat areas; create contour furrows on slopes.
2. **Hardpan Breaking:** Deep subsoiling once to restore infiltration.
3. **Light Germination Irrigation:** Apply just enough 6000 ppm water to moisten topsoil for seed germination.
4. **Cover Crop Planting:**
 - **If no planter:** Broadcast Jantar seed, form raised beds, apply mulch.
 - **If planter available:** Make raised beds, plant seed on beds, mulch immediately.
5. **Mulch Management:** Maintain thick organic mulch to conserve moisture and suppress salt rise.
6. **Chop-and-Drop:** When Jantar reaches ~6 feet, cut top growth and layer on beds as mulch. Roots remain intact.
7. **No-Till Cash Crop Planting:** Immediately plant next crop with no-till planter or handheld dribbler.
8. **Minimal Furrow Irrigation (if needed):**
 - Run water slowly in furrows ($\leq \frac{1}{2}$ furrow height).
 - Check soil moisture at seed depth after 3–4 days.
 - Repeat only if necessary until crop establishment.

6. Salt Dynamics in PQNK vs. Conventional Systems

Table 2: Comparative Salt Addition (kg/acre) Using Different TDS Water

PQNK Advantage: 90% less water means 90% less salt added, even with high-TDS water.

7. Long-Term Management of Saline Water in PQNK

Once soil biology is active:

- **Salt-Tolerant Crops:** Use in early transition (e.g., Jantar, barley, sorghum).
- **Mulching:** Non-negotiable to reduce evaporation-driven salt accumulation.
- **Organic Amendments:** Compost and root exudates enhance microbial processing of salts.
- **Irrigation Strategy:** Only light, infrequent furrow irrigation if necessary; prioritize soil moisture monitoring.

8. Final Advisory

For the Farmer with 6000 ppm Water & pH 8 Soil:

1. Test soil drainage before considering leaching.
2. In most cases, skip water wash and sulfuric acid.
3. Proceed directly with Jantar planting as per Step-by-Step Protocol.
4. Trust the biological system: Jantar will improve soil structure, stimulate microbes, and begin natural salt cycling.
5. After Jantar, adopt full PQNK practices: no-till, mulch, minimal irrigation.

For Extension Advisors:

- Encourage farmers to observe soil life and moisture, not just salt and pH.
- Promote mulch-based systems for evaporative control.
- Use the decision table (Table 1) to customize advice for varying water quality and soil conditions.

9. PQNK Principle Reiterated

During the lifespan of a rice crop, around 6.6 million liters of water are applied, resulting in the introduction of 13,158 kilograms of dissolved solids per acre of land. However, when growing rice using PQNK, we know that the crop only needs 0.5 million liters of water. Thus, the remaining 6.1 million liters are wasted, adding an extra 12,130 kg of dissolved solids with every crop. **Below is the table 2, split into two parts:**

Comparative Salt Addition (kg/acre) Using Different TDS Water							
Water TDS (ppm)	Solids in 1000 L (kg)	Wheat-Conv	Wheat-PQNK	Cotton-Conv	Cotton-PQNK	Corn Autumn-Conv	Corn Autumn-PQNK
500	0.5	822	154	1,131	257	668	154
1,000	1.0	1,645	308	2,262	514	1,336	308
1,500	1.5	2,467	463	3,392	771	2,005	463
2,000	2.0	3,290	617	4,523	1,028	2,673	617
2,500	2.5	4,112	771	5,654	1,285	3,341	771
3,000	3.0	4,934	925	6,785	1,542	4,009	925
3,500	3.5	5,757	1,079	7,916	1,799	4,677	1,079
4,000	4.0	6,579	1,233	9,046	2,056	5,346	1,233
4,500	4.5	7,402	1,388	10,177	2,313	6,014	1,388
5,000	5.0	8,224	1,542	11,308	2,570	6,682	1,542
5,500	5.5	9,046	1,696	12,439	2,827	7,350	1,696
6,000	6.0	9,869	1,850	13,570	3,084	8,018	1,850

Comparative Salt Addition (kg/acre) Using Different TDS Water									
Water TDS (ppm)	Solids in 1000 L (kg)	Corn Spring-Conv	Corn Spring-PQNK	Potato-Conv	Potato-PQNK	Sugarcane-Conv	Sugarcane-PQNK	Rice-Conv	Rice-PQNK
500	0.5	1,028	206	668	154	3,290	411	3,290	257
1,000	1.0	2,056	411	1,336	308	6,579	822	6,579	514
1,500	1.5	3,084	617	2,005	463	9,869	1,233	9,869	771
2,000	2.0	4,112	822	2,673	617	13,158	1,645	13,158	1,028
2,500	2.5	5,140	1,028	3,341	771	16,448	2,056	16,448	1,285
3,000	3.0	6,168	1,233	4,009	925	19,738	2,467	19,738	1,542
3,500	3.5	7,196	1,439	4,677	1,079	23,027	2,878	23,027	1,799
4,000	4.0	8,224	1,645	5,346	1,233	26,317	3,289	26,317	2,056
4,500	4.5	9,252	1,850	6,014	1,388	29,606	3,700	29,606	2,313
5,000	5.0	10,280	2,056	6,682	1,542	32,896	4,112	32,896	2,570
5,500	5.5	11,308	2,261	7,350	1,696	36,186	4,523	36,186	2,827
6,000	6.0	12,336	2,467	8,018	1,850	39,475	4,934	39,475	3,084

Rider: These figures represent a transitional phase. In a well-established PQNK system, irrigation is not necessary.

“The soil is a living ecosystem. Feed its life, ensure its structure, and it will manage water and minerals for sustained productivity.”

Water washing is a temporary, often risky, intervention. Building soil biology is the permanent, low-risk, regenerative solution.

Document Prepared by: PQNK Research & Advisory Group

For Pristine Organic Transition

“From salt problems to soil solutions.”

***Footnote:** PQNK (pronounced 'picnic')—the regenerative & sustainable Pristine Organic Farming System—is grounded in Natural Ecosystem Science. This science employs perennial biodiversity, protects soil with organic mulch, and avoids practices like water inundation, tillage disturbance, and leaving soil bare.*

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