PQNK Technical Assessment

Evaluation of Tube-well Water Quality for Irrigation

Comparison of Water from 500 ft and 580 ft Aquifers

Two water samples from the same location were analyzed by the Soil & Water Testing Laboratory, Government of the Punjab. The objective of this review is not only to interpret the laboratory results according to conventional irrigation science, but also to evaluate their practical suitability under the **PQNK (Paedar Qudratti Nizam Kashtkari)** production system, where irrigation management, soil biology and soil structure differ fundamentally from conventional agriculture.

The first sample was collected from a **500-foot** depth, while the second was collected after deepening the bore to **580 feet**.

Laboratory Results

Parameter	500 ft	580 ft	Change
Electrical Conductivity (EC)	2578 μS/cm	1682 μS/cm	Improved by about 35%
Calcium + Magnesium	3.36	5.46	Increased
Sodium (Na)	22.42	11.36	Reduced by about 49%
Carbonate	Nil	Nil	No change
Bicarbonate (HCO_3)	7.84	8.78	Slight increase
Chloride	9.32	6.19	Reduced
Residual Sodium Carbonate (RSC)	4.49	3.20	Improved
Sodium Adsorption Ratio (SAR)	17.30	6.88	Improved dramatically

The laboratory classified **both samples as unsuitable for irrigation**, although the second sample is chemically much better than the first.

Conventional Interpretation

From the standpoint of conventional flood irrigation, the laboratory's conclusion is understandable.

The **500-foot water** presents three major problems simultaneously:

- high salinity,

- very high sodium hazard,
- high residual sodium carbonate.

Repeated use of such water under conventional cultivation is likely to deteriorate soil structure, reduce infiltration, increase sodicity and progressively lower productivity.

The **580-foot sample** is significantly better. Salinity has decreased, sodium has been reduced by almost half and SAR has fallen from **17.30 to 6.88**, representing a substantial improvement.

Nevertheless, the RSC remains relatively high at **3.20 meq/L**, indicating that bicarbonate may continue to precipitate calcium and magnesium from the soil solution, gradually allowing sodium to dominate the exchange complex. Under conventional flood irrigation this remains a concern.

For this reason the laboratory continues to classify the water as unsuitable.

PQNK Interpretation

PQNK evaluates irrigation water from a different perspective.

The laboratory assessment assumes the water will be used under **conventional agriculture**, where fields are repeatedly cultivated, left bare, flooded during irrigation and exposed to high evaporation.

These practices magnify the harmful effects of marginal-quality irrigation water.

PQNK changes the production environment completely.

Permanent raised beds protect soil structure.

The soil is never cultivated after the transition.

Organic mulch permanently covers the surface.

Water is applied only through permanent furrows rather than flooding the entire field.

The biological root zone remains aerated and biologically active.

Rainfall infiltration improves naturally.

Evaporation from the soil surface decreases substantially.

Consequently, the same irrigation water behaves differently because it is entering a living biological system rather than a repeatedly disturbed mineral soil.

Which Water Should Be Used?

The comparison clearly demonstrates that **deepening the bore from 500 feet to 580 feet accessed a considerably better aquifer.**

The improvements are substantial.

- Salinity declined by approximately one-third.

- Sodium concentration was reduced by almost one-half.
- SAR declined by approximately sixty percent.
- Calcium and magnesium increased.
- Chloride concentration decreased.

These changes indicate that the deeper aquifer contains significantly better irrigation water.

If irrigation must rely entirely on groundwater, the **580-foot source should always be preferred**.

The 500-foot source should be avoided whenever possible.

Can the 580-foot Water Be Used Successfully?

Under conventional agriculture, continuous use of this water would still require caution because of its relatively high bicarbonate concentration and RSC.

Under PQNK, however, the answer is considerably more encouraging.

Provided the complete PQNK transition protocol is followed, this water should perform satisfactorily.

The key phrase is **complete PQNK transition**.

Water quality alone never determines success.

Soil biology, infiltration, aeration, organic matter and irrigation management determine how the water behaves after entering the soil.

PQNK Management Protocol

For successful long-term use of this groundwater, the following PQNK practices should be followed.

The hardpan should be broken once before conversion.

If the soil is alkaline, the PQNK soil correction protocol should be completed before establishing permanent beds.

Permanent raised beds and permanent furrows should then be constructed.

The soil should never again be cultivated.

Crop residues should remain on the surface as permanent mulch.

Living roots should remain in the soil throughout the year.

Irrigation should be applied only through permanent furrows and only when plants actually require water.

Flood irrigation should never be practiced.

As soil organic matter and biological activity increase, the soil becomes progressively more capable of buffering the effects of marginal irrigation water.

Future Monitoring

Because groundwater quality can change over time, the 580-foot water should be retested periodically.

Soil should also be monitored during the first few years of transition.

The important indicators include:

- soil pH,
- electrical conductivity,
- exchangeable sodium,
- infiltration rate,
- organic matter,
- biological activity.

If these indicators continue improving, the irrigation strategy is working successfully.

Final Conclusion

The laboratory correctly classified both samples according to **conventional irrigation standards**.

However, the comparison between the two depths clearly shows that the **580-foot aquifer is substantially superior to the 500-foot aquifer**.

From the PQNK perspective, this deeper water source is **acceptable for irrigation**, provided it is used within a fully established PQNK production system and not under conventional flood irrigation.

The critical point is that **PQNK does not claim to improve the chemistry of irrigation water**. Instead, it improves the biological and physical condition of the soil so that marginal-quality irrigation water can be utilized far more efficiently and with significantly lower long-term risk.

The deeper aquifer therefore represents a practical and encouraging improvement, and when combined with the complete PQNK transition protocol, it should provide a reliable source of irrigation water for sustainable crop production.

Applying PQNK without understanding nature's operating system will not deliver abundance, stability, or nutrient density.

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 such as water inundation, tillage disturbance, and leaving soil bare.*

It is the ***process*** *that matters most. PQNK is a pristine production system designed not merely for yield, but for optimal, balanced output—where quality, sustainability, and ecological harmony emerge from a self-regulated, zero-external-input methodology.*

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