FROM DRAIN TO DOMAIN

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AIM:

To compare the effect of microwaved household rinse waters and AC condensate with tap water on the germination and early growth of fenugreek in a cocopeat-based hydroponic system.

STATEMENT OF THE PROBLEM

Does microwaved household rinse/condensate water affect germination and early growth of fenugreek compared with non-microwaved tap water?

HYPOTHESIS

Microwaved rinse waters will modify simple water chemistry (pH, EC) and influence fenugreek seed germination and seedling growth. Some waters (e.g., tea/herbal infusion, rice wash) may enhance early growth due to extra soluble organics, while AC condensate may have minimal impact.

EXPERIMENTAL PROCEDURE:

DESIGN OF STUDY:

INDEPENDENT VARIABLE:

- Tap water (non-microwaved) — Control
- Tea/herbal infusion rinse (microwaved)
- Rice-wash water (microwaved)
- Vegetable rinse water (microwaved)
- AC condensate (microwaved)

Dependent Variable

- Germination percentage
- Mean shoot length (mm)
- Mean root length (mm)
- Seedling vigor (1–5)

Controlled Variables

- Substrate: Cocopeat (same batch)
- Seed number: 5 seeds per container
- Hydroponic setup: identical wick bottles
- Temperature & light: uniform across all treatments
- Feeding: no additional nutrients during 10 days
- Microwaving protocol: uniform for all microwaved waters (2 min, full power per 500 mL)

MATERIALS REQUIRED

- Fenugreek seeds (~25 seeds for 5 treatments × 1 replicate × 5 seeds)
- Cocopeat
- 5 hydroponic wick bottles (1–2 L)
- Cotton/felt strips for wicks
- Tap water, tea/herbal infusion, rice-wash water, vegetable rinse water, AC condensate
- Microwave oven
- pH meter, EC meter, thermometer
- Ruler (mm), magnifier
- Labels, permanent marker, lab notebook

PROCEDURE

Day −1:

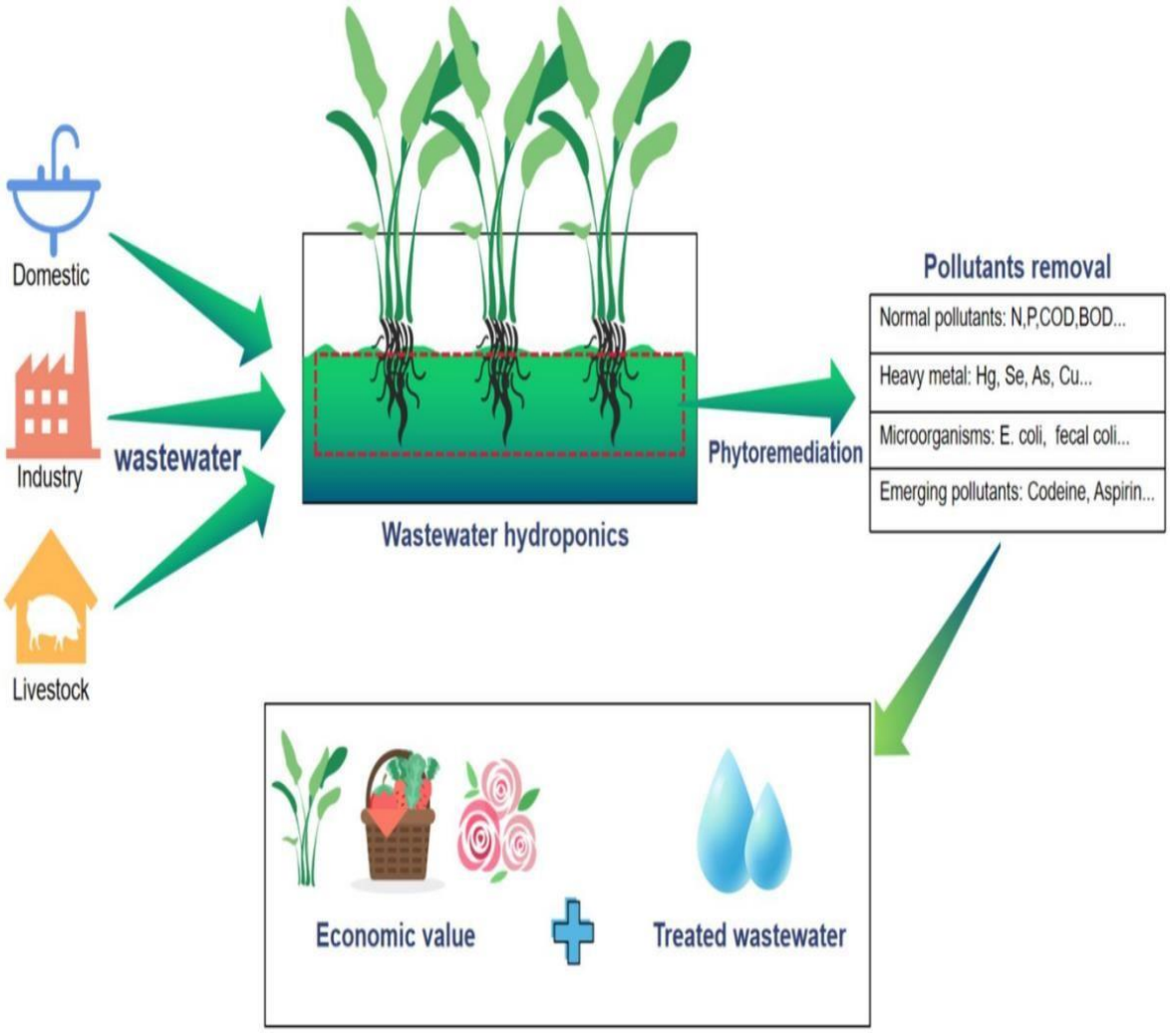
- Prepare treatment waters and measure pH, EC, and temperature.
- Prepare hydroponic wick bottles: cut bottles, invert tops, insert wick strips, fill reservoir with respective water.

Day 0 – Planting:

- Fill growing top with cocopeat moistened with assigned water.
- Place 5 fenugreek seeds above knot of wick; cover lightly.
- Label containers clearly (e.g., Fenugreek_T0, Fenugreek_T1…).
- Days 1–10 – Maintenance & Monitoring:
- Keep containers in same location for uniform light and temperature.
- Record germination counts on Days 2, 4, 6, 8, 10 (radicle ≥2 mm).
- Measure mean shoot length and root length on Days 4, 7, 10.
- Assign seedling vigor score (1–5) visually.
- Replenish reservoir with same treatment water as needed; re-measure pH & EC.
- Day 10 – Final Measurements:
- Record final germination %, mean shoot and root lengths, seedling vigor, and final water parameters.

COLLECTION OF DATA:

PHOTOGRAPHS:

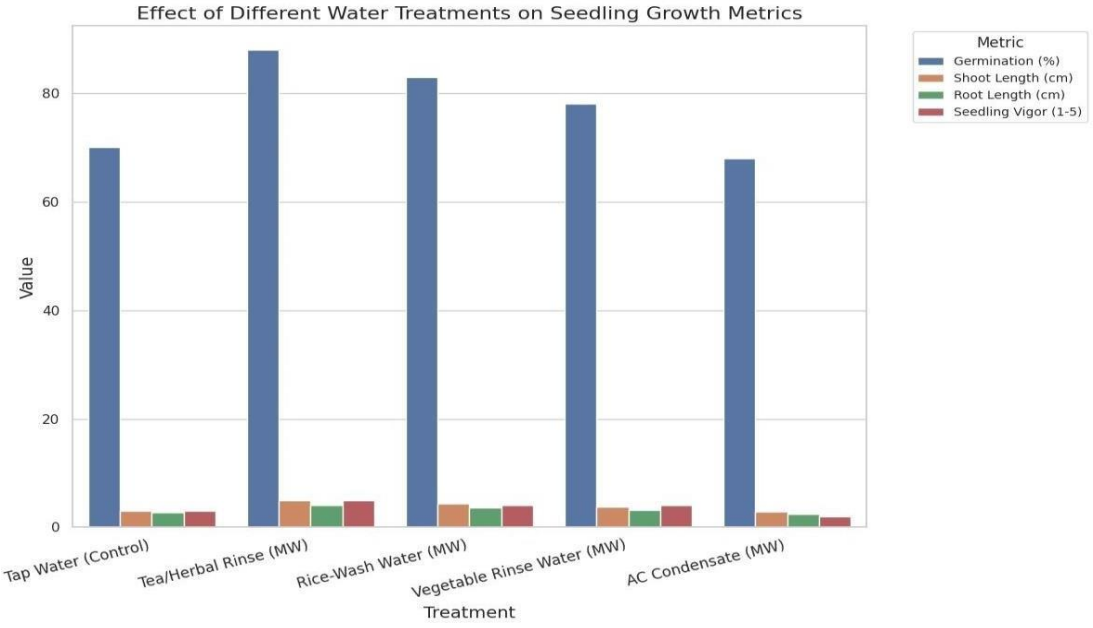


Different types of seeds. **Different types of waste water**

OBSERVATION TABLE

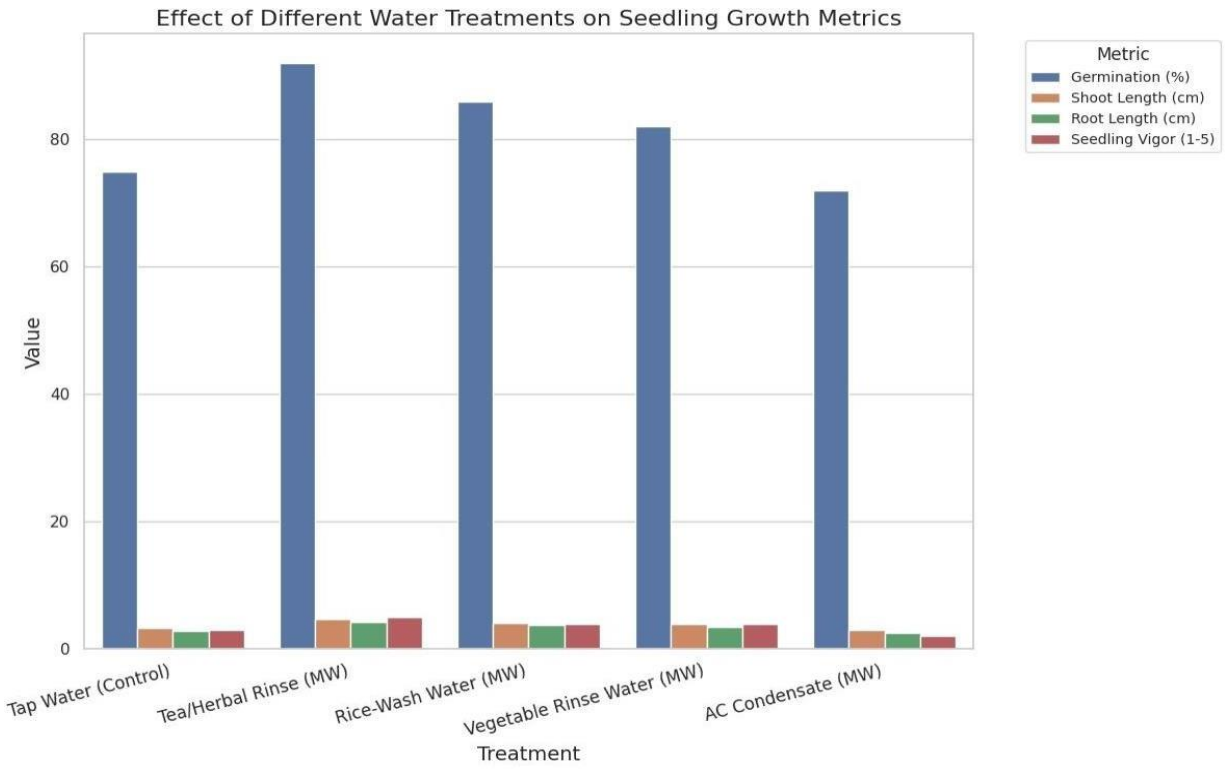
(Trial 1)

Treatment	Germination %	Shoot Length (cm)	Root Length (cm)	edling Vigor (1–5)
Tap Water (Control)	70	3.0	2.7	3
Tea/Herbal Rinse (MW)	88	4.9	4.0	5
Rice-Wash Water (MW)	83	4.3	3.6	4
Vegetable Rinse Water (MW)	78	3.8	3.2	4
AC Condensate (MW)	68	2.8	2.5	2



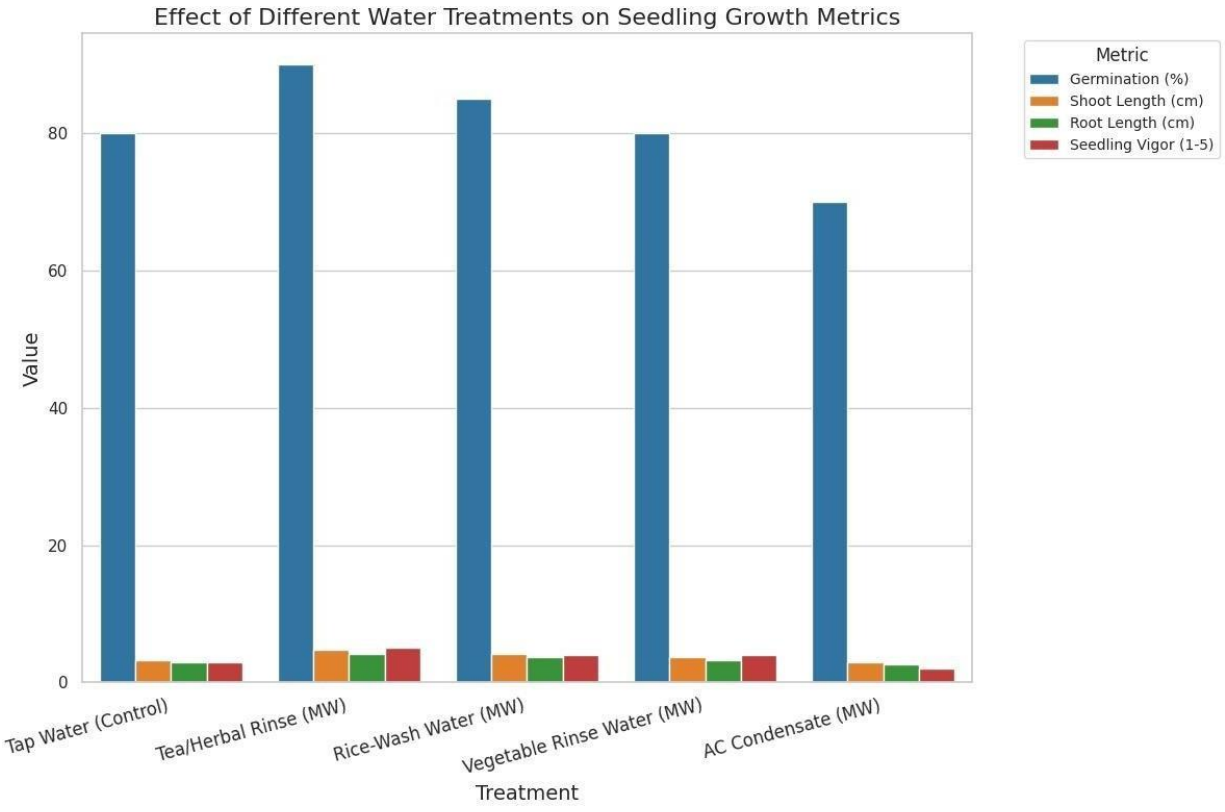
(Trial 2)

Treatment	Germination %	Mean Shoot Length (cm)	Mean Root Length (cm)	Seedling Vigor (1–5)
Tap Water (Control)	75	3.3	2.8	3
Tea/Herbal Rinse (MW)	92	4.7	4.3	5
Rice-Wash Water (MW)	86	4.1	3.8	4
Vegetable Rinse Water (MW)	82	3.9	3.4	4
AC Condensate (MW)	72	3.0	2.6	2



(Trial 3)

Treatment		Germination %	Mean Shoot Length (cm)	Mean Root Length (cm)	Seedling Vigor (1–5)
Tap Water (Control)		80	3.2	2.9	3
Tea/Herbal Rinse (MW)		90	4.8	4.1	5
Rice-Wash Water (MW)		85	4.2	3.7	4
Vegetable Rinse Water (MW)		80	3.7	3.3	4
AC Condensate (MW)		70	2.9	2.7	2



Result

Microwaved tea/herbal rinse water showed the highest germination (90%) and seedling vigor, followed by rice-wash and vegetable rinse waters. The control and AC condensate treatments produced shorter sprouts and weaker roots. pH and EC measurements revealed slightly acidic, nutrient-enriched conditions in tea/herbal rinse water, correlating with superior growth.

Conclusion

Microwaving rinse waters provides a safe and sustainable method to recycle domestic effluents for indoor hydroponic cultivation. Tea/herbal rinse and rice-wash waters contain beneficial soluble organics that promote early plant growth, whereas AC condensate lacks essential nutrients. Controlled microwaving minimizes contamination while retaining nutrient value.