Food and Agriculture Organization of the United Nations

European Bank for Reconstruction and Development

Improving Water Productivity in the Date Palm Sector
Insights from the West Bank, Palestine

CAIRO WATER WEEK

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FAO

Improving Water Productivity in the Date Palm Sector

Insights from the West Bank, Palestine

FAO/EBRD Food Security Package:
Maximizing water productivity via evidence-based policies

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FAO / EBRD Cooperation in the SEMED Region



Executive takeaways

Three connected levers can raise value per drop

Physical water productivity

0.5–2.1 kg/m^3

Financial water productivity

≈ USD 3.66/m^3

Potential water reallocation

≈ 1 million m^3

Irrigation management

- Benchmark water use by tree age
- Correct seasonal scheduling
- Use remote sensing for targeting

Farm management

- AETI explains only 18% of mature-tree yield variation
- Improve pollination, thinning and nutrition
- Link agronomy to fruit quality

Quality and markets

- Premium grades command much higher prices
- Reduce farm and packhouse losses
- Strengthen transparent grading

A strategic sector under mounting water pressure

High economic and social value depends on groundwater sustainability

Producing trees	Annual production, 2024	Seasonal jobs	Export value growth, 2019–23
≈ 350,000	≈ 20,000 t	5,000–7,000	+66%

The core challenge

Dependence on groundwater, widespread lack of metering, aquifer over-abstraction, rising salinity and hotter, drier conditions threaten long-term productivity and competitiveness.

Study approach

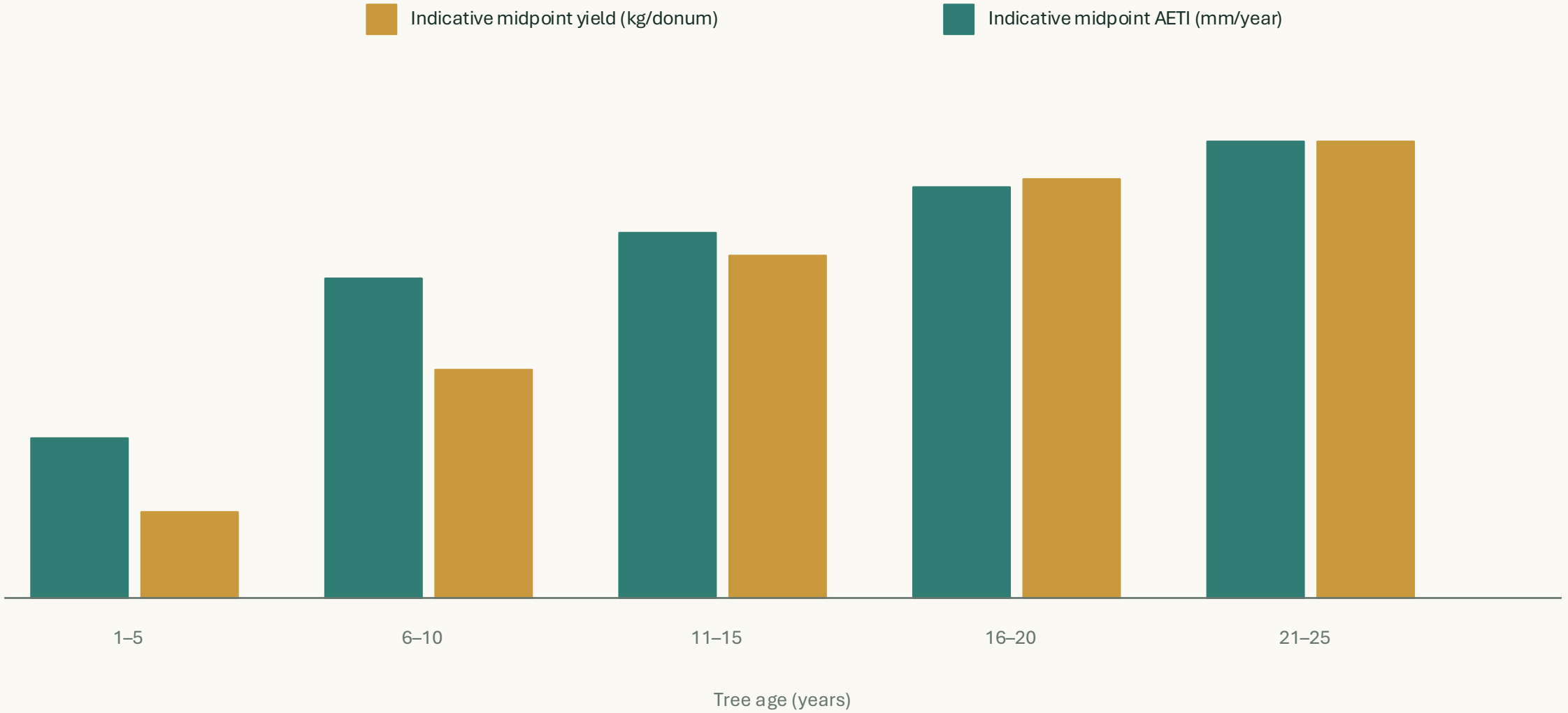
Remote sensing, field surveys and economic analysis were integrated



WaPOR	20 m AETI and rainfall, Oct 2022–Sep 2023
Yield survey	112 farms; 100 valid records for trees at least 8 years old
Tree age	Landsat time series and NDVI, classified in five-year bands
Management	17 farms plus metered irrigation from 13 neighbouring farms
Economics	Gross margins and grade-price data from four packhouses

Tree age defines the water-use and yield baseline

Both AETI and yield increase as plantations mature

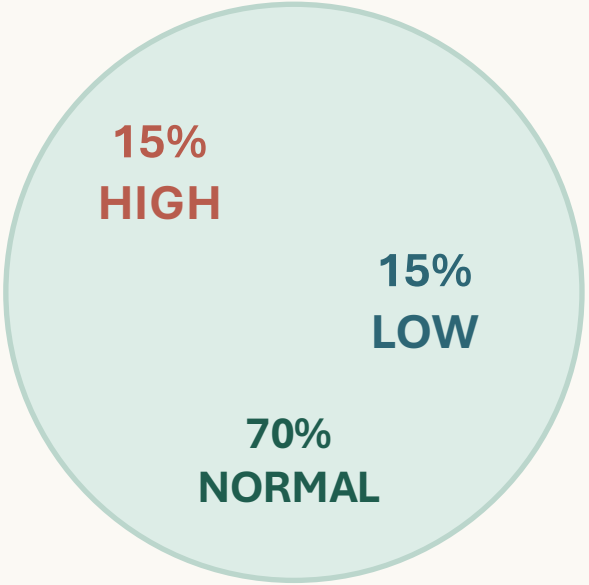


Apparent over- and under-irrigation

The principal opportunity is redistribution rather than lower total use

High-use tail: 15% of land

- Average 103 mm above the normal upper range
- Potential saving of about 1 million m^3
- Lower pumping and nutrient-leaching risks



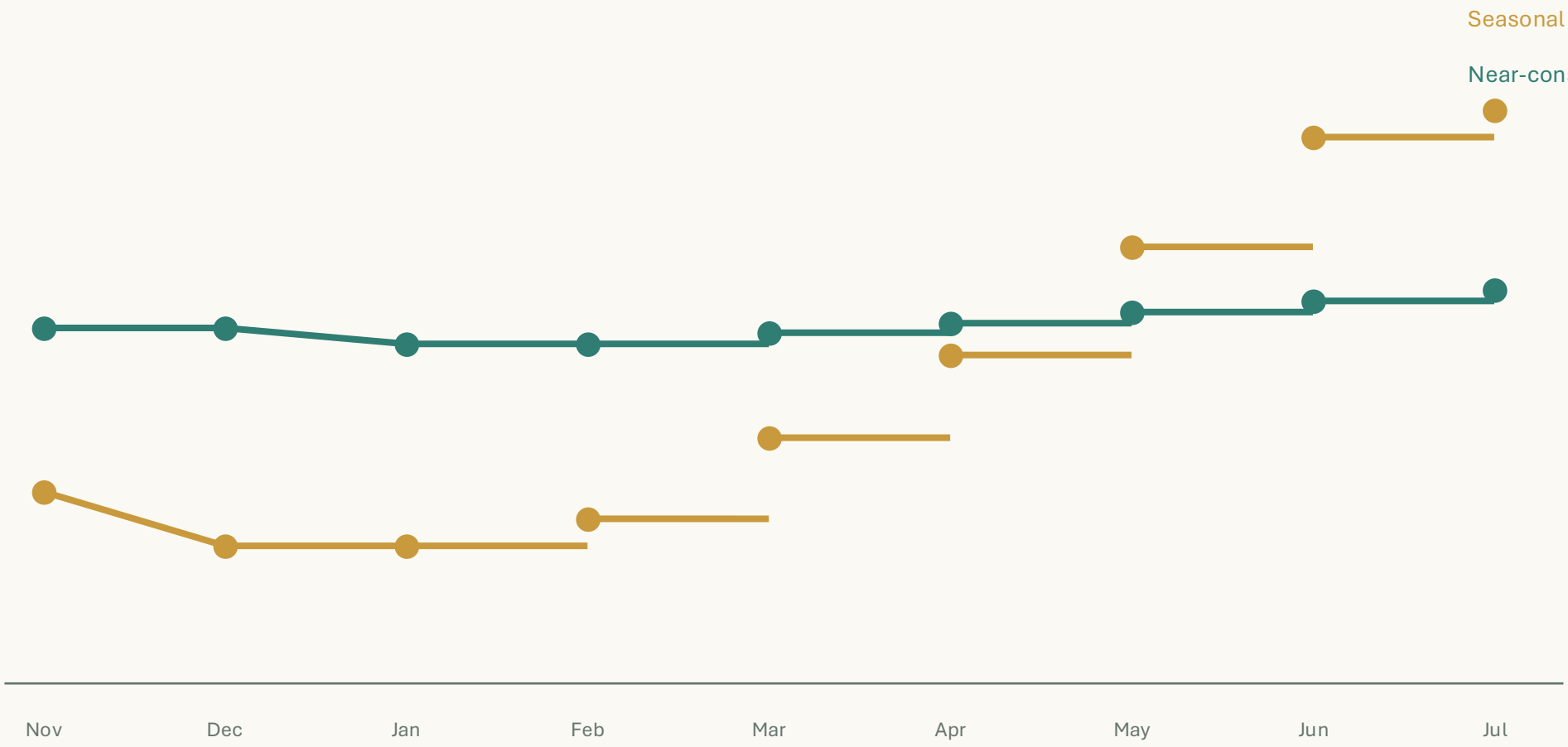
Low-use tail: 15% of land

- Average 102 mm below the normal range
- About 1 million m^3 additional water required
- Potential yield gain where water is available

Regional outcome: broadly unchanged total water use, but better allocation across farms.

Irrigation scheduling: timing may make the difference

Observed application patterns do not consistently match peak crop demand

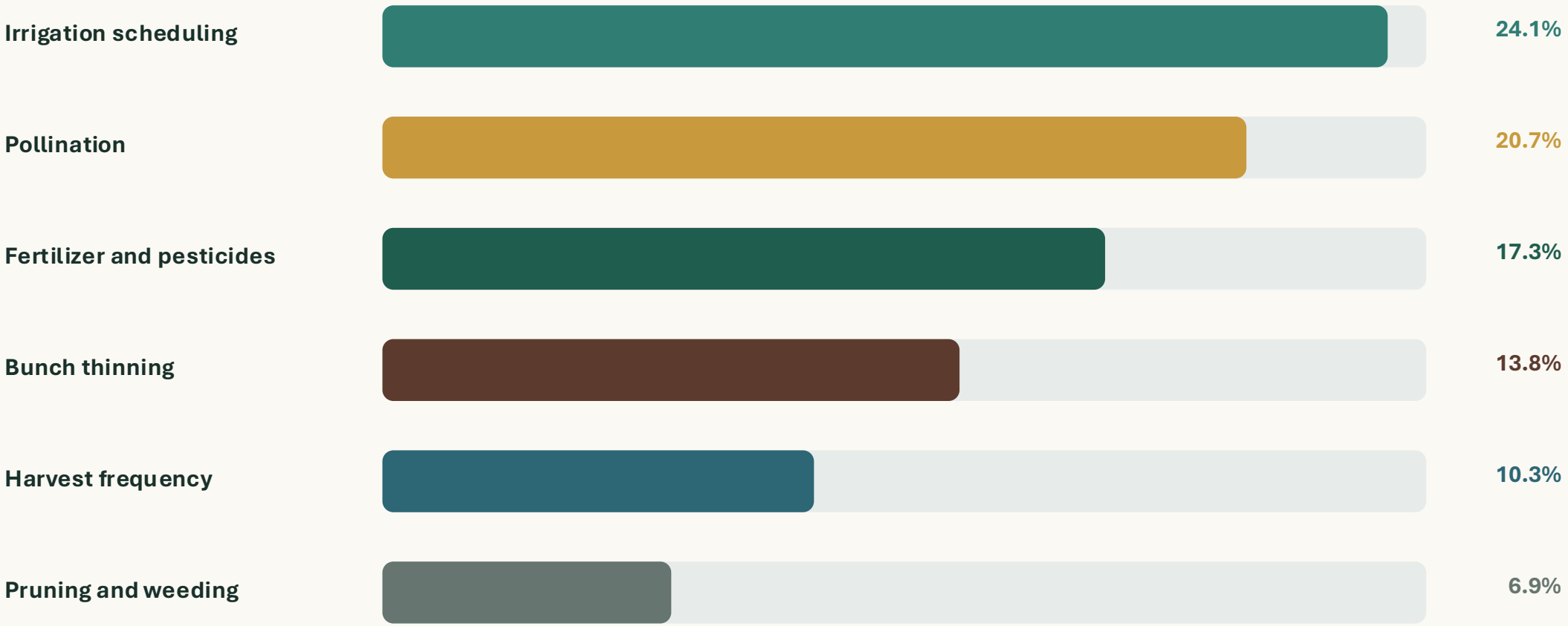


Suggested shift

Reduce winter application
Increase water in June–July

Farm practices influence yield and quality

Ranking from the analytical hierarchy assessment



The management sample was small, so these rankings guide research and extension rather than prove causality.

Quality offers the strongest economic lever

Packhouse prices reveal major rewards for higher grades and lower losses



Super Jumbo | Packhouse Y

USD 12.43/kg

Packhouse Y average

USD 6.80/kg

Packhouse X average

USD 2.43/kg

Reported farmgate loss

≈ 8%

Illustrative upgrading scenario

Moving the selling price from USD 4.03 to USD 5.66/kg raises annual gross margin by about USD 966 per dunum.

Economic impact: irrigation incentives are modest

The valuation of water determines whether farms have a reason to change

Cut over-irrigation
Pumping cost

+0.2%

$45k study-area benefit

Cut over-irrigation
Market water price

+1.5%

$450k study-area benefit

Correct under-irrigation
Pumping cost

+1.6%

$470k study-area benefit

Correct under-irrigation
Market water price

+0.3%

$75k study-area benefit

Conclusion: quality improvement offers a substantially stronger business case than water-volume adjustment alone.

Policy and investment package

Three pillars for integrated, scalable implementation

1 | Irrigation efficiency

- Seasonal guidelines by tree age
- Extension training on scheduling and salinity
- Weather-informed app and SMS advice
- Central georeferenced database
- Meters and sensors on demonstration farms

2 | Quality and post-harvest

- Standardize grading criteria
- Improve price and grade transparency
- Upgrade sorting, drying and cold storage
- Incentivize better farm practices
- Reduce losses across the value chain

3 | Technical and market support

- Integrated farmer curriculum
- Packhouse advisory services
- Cooperative negotiation mechanisms
- Market intelligence and promotion
- Incentivized voluntary data sharing

Proposed implementation roadmap

0–6 months

FOUNDATION

- Align data and grading standards
- Select demonstration farms
- Design age-based irrigation protocols

6–18 months

PILOT

- Install meters and run scheduling trials
- Launch minimum viable app/SMS service (well function and deployed Mobile App.
- Conduct quality trials with packhouses

18–36 months

SCALE

- Expand WaPOR-based extension
- Finance post-harvest upgrades
- Track water, quality and income outcomes

End goal: higher value and quality, fairer water allocation, and decisions grounded in evidence.

Thank you

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LESSONS LEARNT

Lessons learnt (1 of 3): from evidence to investment

1. Physical WP is Production/Yield; EWP is driven by the same two things

2. Farmer-reported water use is almost meaningless, as not measured & not recorded, so: 1) Farm data need meters & records and 2) WaPOR may fill the gap

3. Yield is key and worth checking carefully, matter far more than the price of each pesticide

4. Price comes in third place and deserves more attention - one crop may sell at several prices

5. Quality may or may not matter to the farmer: 1) If government sets the price or wholesales just pay for quantity, quality doesn't benefit the farmer. 2) But if buyers pay for quality, then we need to think how water may affect it

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LESSONS LEARNT

Lessons learnt (2 of 3): from evidence to investment

6 **Almost no correlation between yield & water, whether farm-reported or from WaPOR**

- Measurement errors are part of the story, but probably not the main factor,
- Limited variation in irrigation practice between farms in each survey area,
- Yield depends on many things, yield is just one,
- We found different things in different countries:
  - Tree age for dates in Palestine
  - Tree spacing & variety for citrus on Jordan,
- Many key things are not picked up by quantitative surveys - pruning, thinning, pest control,
- N.B. Agronomy & irrigation are not separate, they are both part of crop production

7 **Some indications that when the water was given may affect yield - worth following up**

8 **Studies identified important issues in each case - the value of WaPOR for strategic diagnosis**

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LESSONS LEARNT

Lessons learnt (3 of 3): from evidence to investment

9 What would we like to add next time?

- Drill down into farm water use, with water meters & soil moisture meters
- Look beyond the farm gate, at marketing, grading, quality & price
- Bring in local agronomists to answer the key question: "Why did these two groups of fams get such different yields, when they both used the same amount of water?"

10 If farmers don't know how much water they are applying, how can they follow our irrigation recommendations? We need simple, practical tools: "Water now" or "Wait"; "Water more", "Water less" or "Keep doing what you're doing now"