

EPIC CASE STUDY

GREENHOUSE 5

AL DAHRA AGRICULTURAL COMPANY, AL AIN, UNITED ARAB EMIRATES

A greenhouse split down the middle. Same crop, same house, same climate: drip on one half, EPIC on the other, a water meter on each.

85%
LESS WATER
370 → 55 m³

102%
MORE CUCUMBER PER PLANT
3.57 → 7.22 kg

46%
LESS FERTILISER
92 → 50 kg

EVIDENCE LEVEL
MEASURED · Metered A/B trial · farm production records · daily meter log

Cucumber crop at Al Dahra, Al Ain, 26 January 2011.

PROJECT RECORD

CLIENT	Al Dahra Agricultural Company
LOCATION	Al Ain, United Arab Emirates
INSTALLED	Systems installed in two greenhouses at the farm: one completed December 2010, the other March 2011
CROP	Cucumber, grown for local markets
CONFIGURATION	Half of Greenhouse 5 converted to EPIC; half left on the existing drip system as the control. 10 rows of plants (2 rows across 5 sections), each section fitted with an EPIC chamber independent of the others; trenches excavated by hand.
WATER METERING	Both halves metered separately
FERTILISER METHOD	Fertigation: fertiliser dissolved in the EPIC reservoir and carried by the water through the system; trace elements applied foliar

THE PROBLEM

Al Dahra is one of the most prominent agricultural companies based in the UAE, producing locally distributed fruit and vegetables. The farm owner and the local municipality were looking to raise the efficiency of local food production, and were researching alternatives to the existing surface drip irrigation.

Two forces pull against each other in this region: more food has to be produced, and there is very little water with which to produce it. About 80% of water in the UAE is used for agricultural purposes.

Water was not the only concern. Under drip, fertiliser tends to seep down into the ground and away from the root zone, a cost to the farm and a contamination risk to groundwater.

WHAT EPIC BUILT

Half of Greenhouse 5 was converted. Trenches were excavated by hand, a Firestone EPDM waterproof liner laid, and EPIC chambers set on top of the liner and connected to the drain header pipe by 2 inch connector pipes to complete a closed loop. A fine gravel layer was placed over the chambers, then a sweet sand layer to finish grade.

Water is delivered from a reservoir tank with a submersible pump. A 90 degree elbow pipe on the drain header sets the water level in the system. The liner holds both water and dissolved fertiliser inside the profile, releasing them to the plant as it draws.

The other half of the house was not altered and continued on drip as the control. Both halves carried water meters.



5 Dec 2010 Trench installation. Liner and chamber pipe in place; the gravel layer goes in before the final sand.



The EPIC Chamber™ set on the Firestone EPDM waterproof liner.

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THE RECORD

Results for the most recent of the two cucumber crops grown after conversion.

	TRADITIONAL DRIP	EPIC SYSTEM	DIFFERENCE
Water consumed	370 m³	55 m³	85% less
Water per kilo of cucumber	40 US gal	3 US gal	92.5% less
Cucumber per plant	3.57 kg	7.22 kg	102% more
Fertiliser used	92 kg	50 kg	46% less

Water per kilo in litres: 151.42 L on drip against 11.35 L on EPIC. Differences are calculated from the figures in each row.

DAILY METER LOG, 2011 CROP

Drip side planted 30 April 2011, EPIC side 3 May 2011. Readings from the farm's Greenhouse 5 data sheet.

	EPIC	TRADITIONAL DRIP	SAVING
Meter, 17 Apr 2011 (before planting)	50.1 m³	249.6 m³	
Meter, 3 Jul 2011	117.3 m³	652.8 m³	
Consumed over the crop	67.2 m³	403.2 m³	83%
Fertiliser, weeks 2 to 11	50.50 kg	116.25 kg	57%

Meters are cumulative: the consumed row is the difference between the two readings, and the saving is calculated from it. The daily saving ran from 94% early in the cycle to 82 to 83% at the last readings on 3 July.

FROM THE SAME DATA SHEET

- **Production.** On 3 July 2011, 414 plants were in production on the EPIC side against 679 on the drip side, at 0.373 and 0.244 boxes per plant respectively: EPIC at 153% of drip production per plant. A box is 16 kg.
- **Nematodes.** The fertiliser sheet records 170 plants lost to nematode. Pesticide for nematode was applied three times on the traditional side in week 2 and not applied on the EPIC side.

ALSO ON THE RECORD

Fourth crop cycle, January 2012. Drip crops were planted five days before the EPIC crops and the EPIC bed sits one foot higher; even so, the EPIC crop was taller and already flowering.

> **FARM FEEDBACK**
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> "They have witnessed water savings of about 82% more than normal in the greenhouse, which is on par with what was predicted."
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> Project brief, Al Dahra farm demonstration site



Lateral movement of water across the EPDM liner and through the gravel layer.



25 Jan 2011 Reservoir tank set in its trench with supply valves.



About three weeks after planting.



The comparison the trial was built for: wilting produce from the conventional drip system on the left, EPIC plants on the right.

RECORDS Al Dahra farm case study and results table; Greenhouse 5 data sheets, June and July 2011; crop cycle no. 4 report, January 2012; site reports, March and April 2011; project brief for the Al Dahra demonstration site.