Israel: A success story for climate resilient agriculture

Drip irrigation's contribution to food security and climate change
Why mechanization is crucial to make it happen

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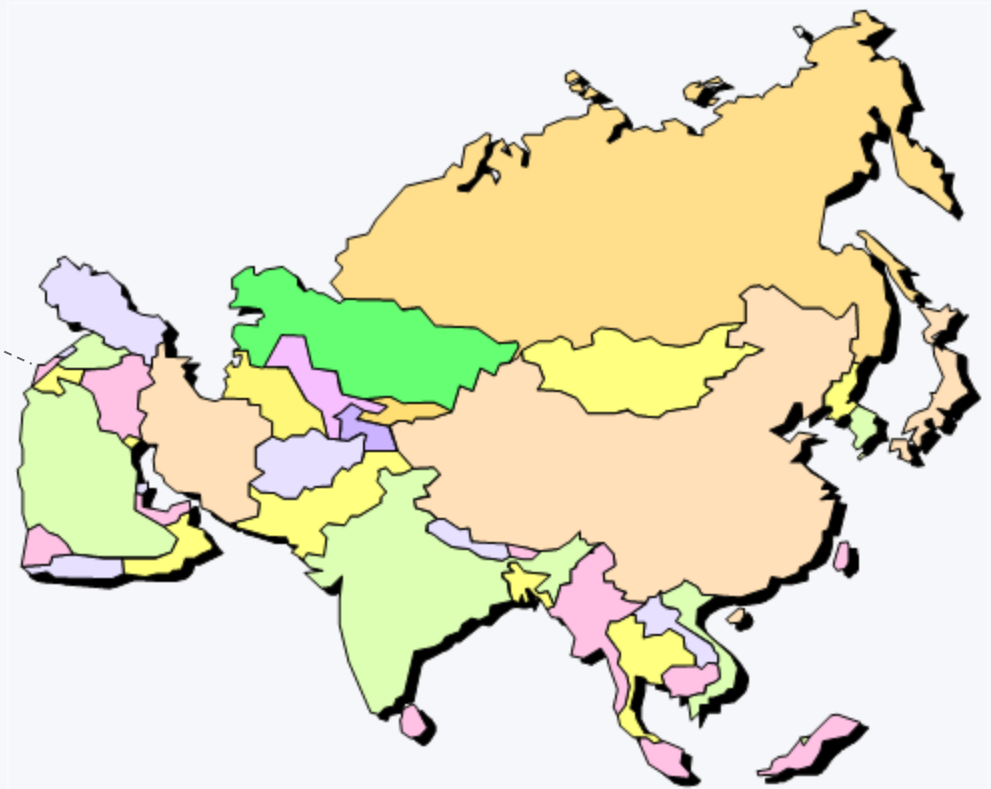
Israel

Small country, big problems

Israel

Location:



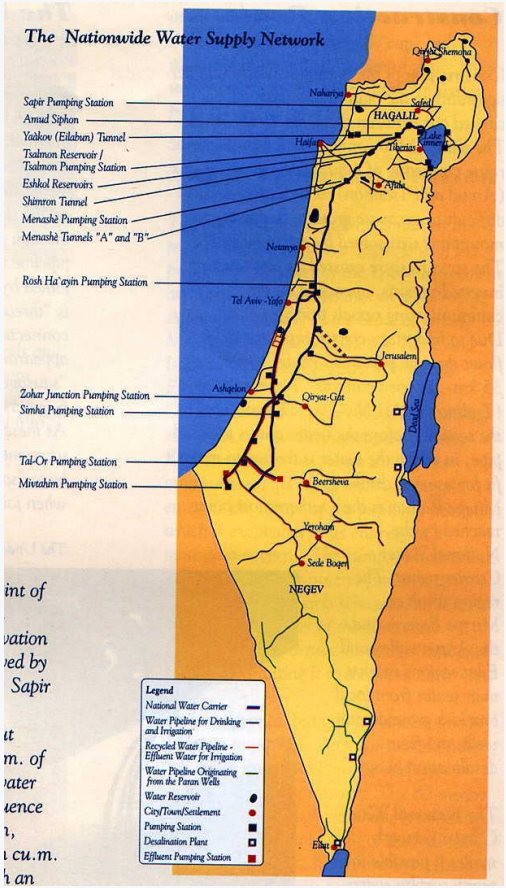
Area:

- Israel: 21,000 km2
- India: 3,287,263 km2

150 times more!

Israel

The national water transporter from the Sea of Galilee to the Negev region. 1964



Israel


0 20 40 km
0 20 40 mi
LEBANON
SYRIA
Golan Heights (Israeli occupied)
Nahariyya
Galilee
Haifa
Lake Tiberias
Mediterranean Sea
Nazareth
Hadera
Petah Tiqwa
Tel Aviv-Yafo
Bat Yam
Holon
West Bank*
Jerusalem
Ashdod
Ashqelon
Gaza Strip*
Dead Sea
Beersheba
Dimona
JORDAN
Negev
EGYPT
Eilat
Gulf of Aqaba
*Israeli occupied with current status subject to the Israeli-Palestinian Interim Agreement - permanent status to be determined through further negotiation.

BEST PRACTICE:
The Israeli Arava Desert

Israel

Government & Drip irrigation are changing the desert.

The challenge

- 60% of Israel is desert. The rest is semi-arid. Water economy is always on the brink of disaster
- In early 90’s, Israel's water reserves have dropped below all red lines and severe short-term measures were taken:
  - Differential drought taxation
  - Prohibition of landscape irrigation other than with recycled wastewater

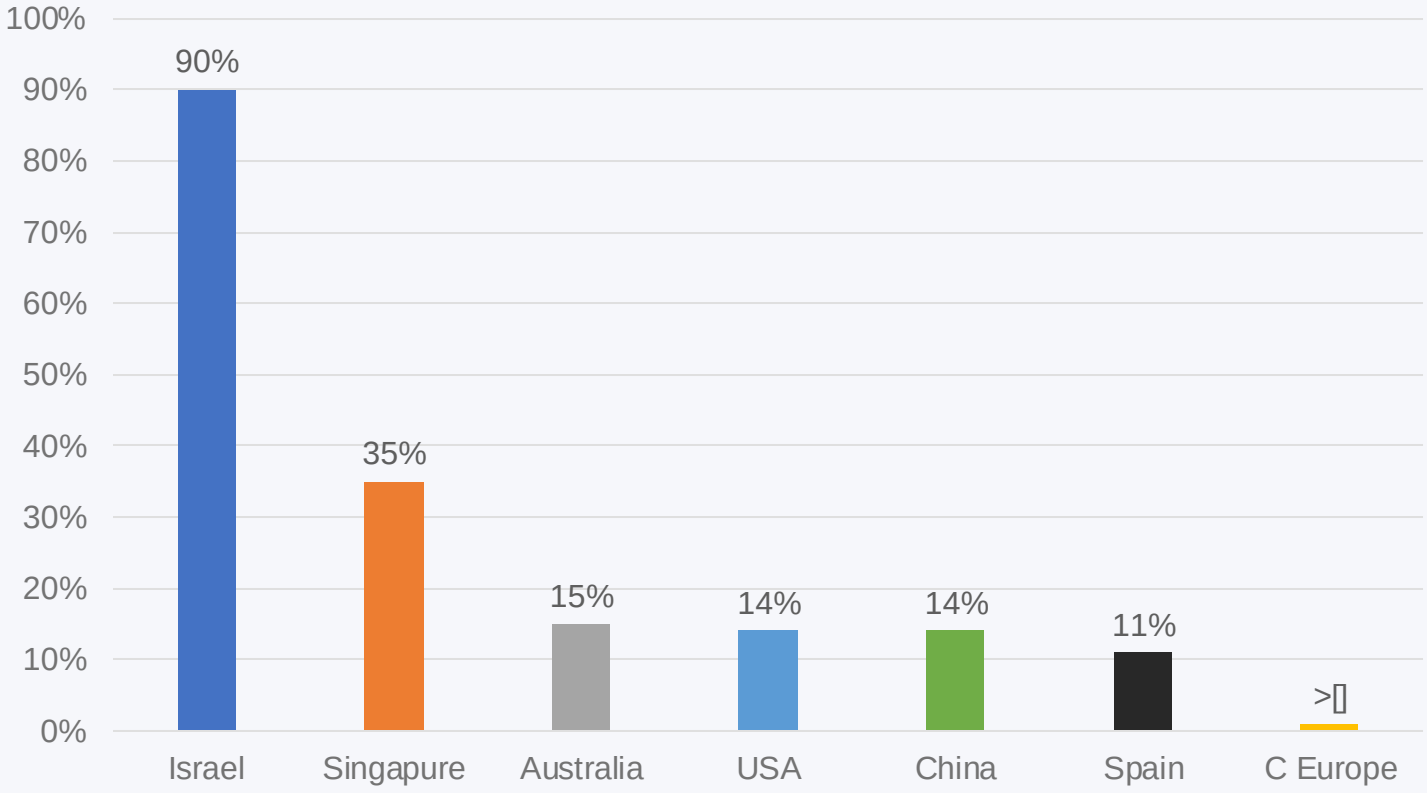
The vision: a sustainable water economy and society

- A comprehensive approach to water use and management
- Developing and adopting several long-term projects
- Assuring that quality water would be reliably available
- In quantities that are sustainable

A coordinated **water policy** was adopted to achieve this vision

- → Clear Legal Framework
- → Integrated Water Management
- → Water Saving Society
- → Water Economy
- → Technology & Innovation

Wastewater recycling – reused effluent in Israel in relation to other counties

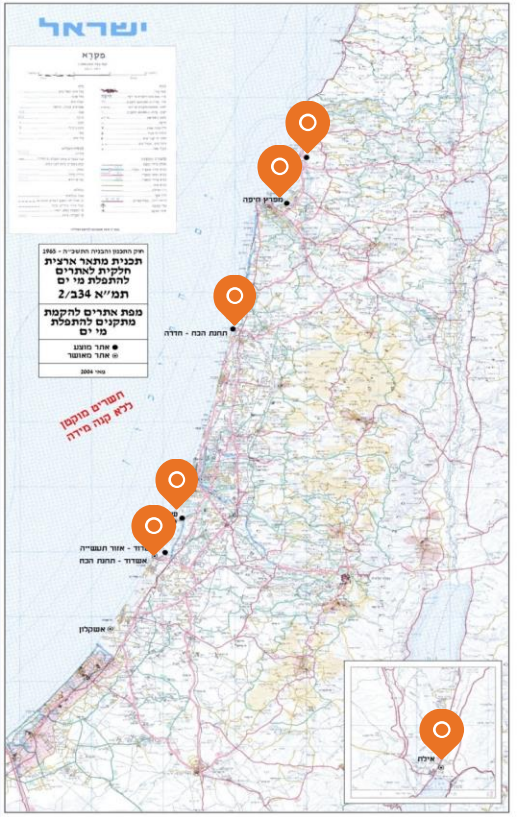


Source: Mekorot Israel 2014

Local treatment facility
in a southern suburb

There are many local treatment facilities in Israel, differing in technology, size and output.
The water is used for local landscaping and agriculture.

National plan for **desalination**



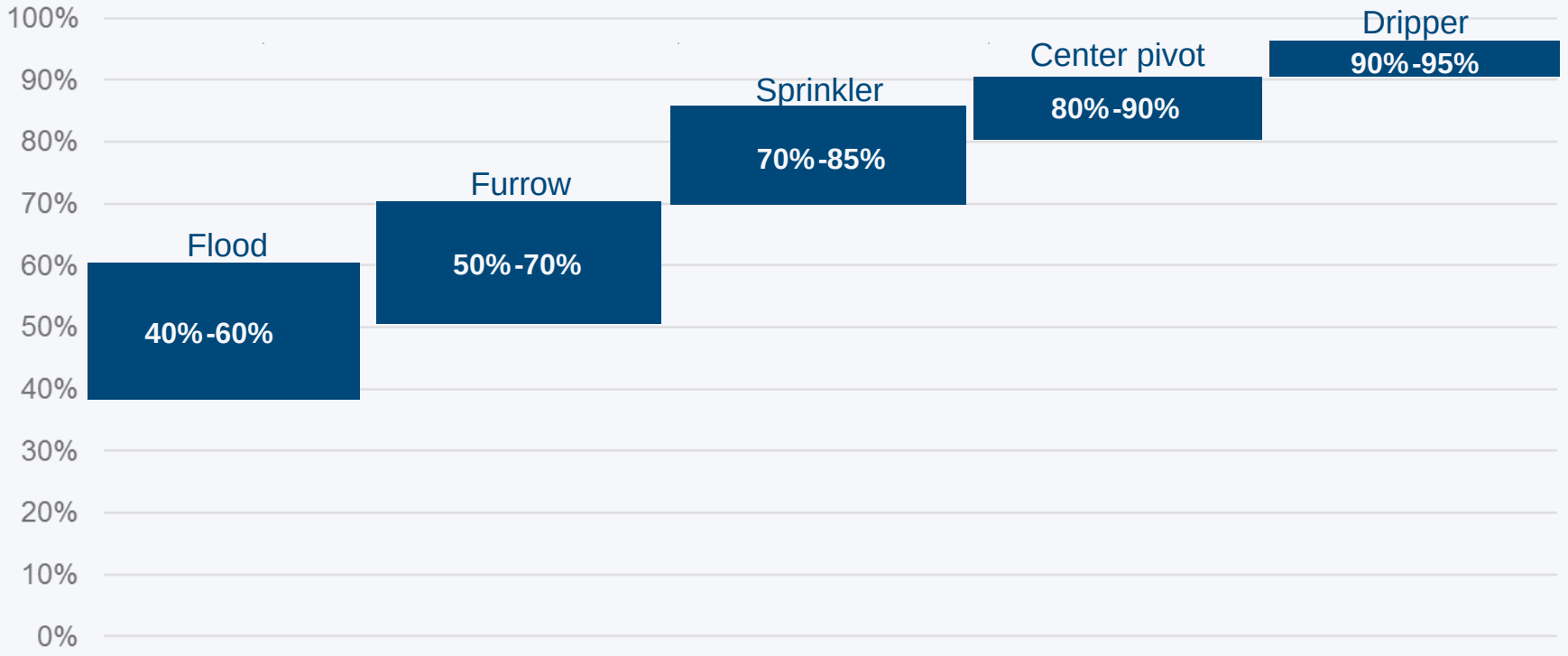
Project Location	Capacity MCM/Year
Hadera Power plant	105
Sorek	122
Palmachim	73
Ashdod Industrial zone	81
Ashkelon	97

Closing the gap: Water resources including desalination (MCM / Year)

Year	2008	2013	2015	2020
Natural resources	675	1,170	1,170	1,170
Brackish water desalination	30	50	70	70
Sea water desalination	140	500	600	750
Total resources	845	1,720	1,840	1,990
Total demand	1,382	1,765	1,840	1,970
Gap	-537	-45	0	+20

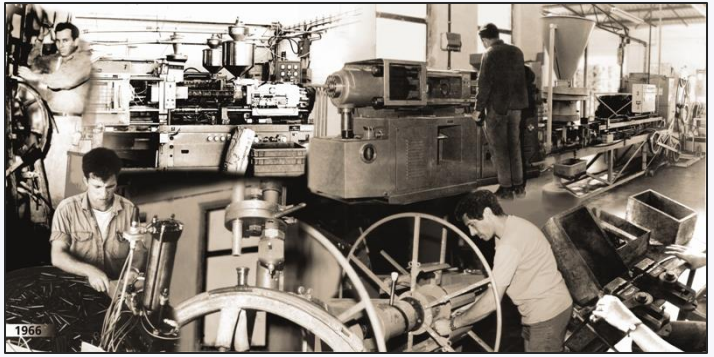
These figures do not include effluents, storm water and brackish water for irrigation in the amount of 500 MCM/Year.

Irrigation efficiency



Netafim at a glance

Born out of a need to make the Israeli desert bloom.



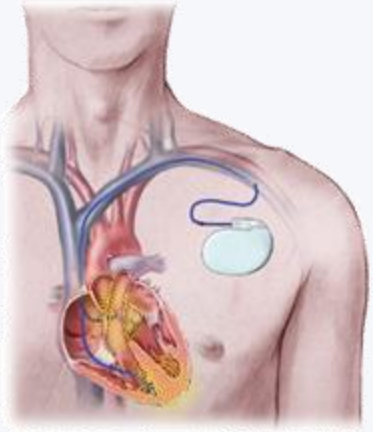
- Simcha Blass and Kibbutz Hatzerim founded Netafim in 1965 with the concept of drip irrigation.

- Netafim was joined by:
  - Kibbutz Magal (1975)
  - Kibbutz Yiftah (1979)

Global presence.

Necessity is the mother of innovation

That’s why we invented the:



Heart Pulsator

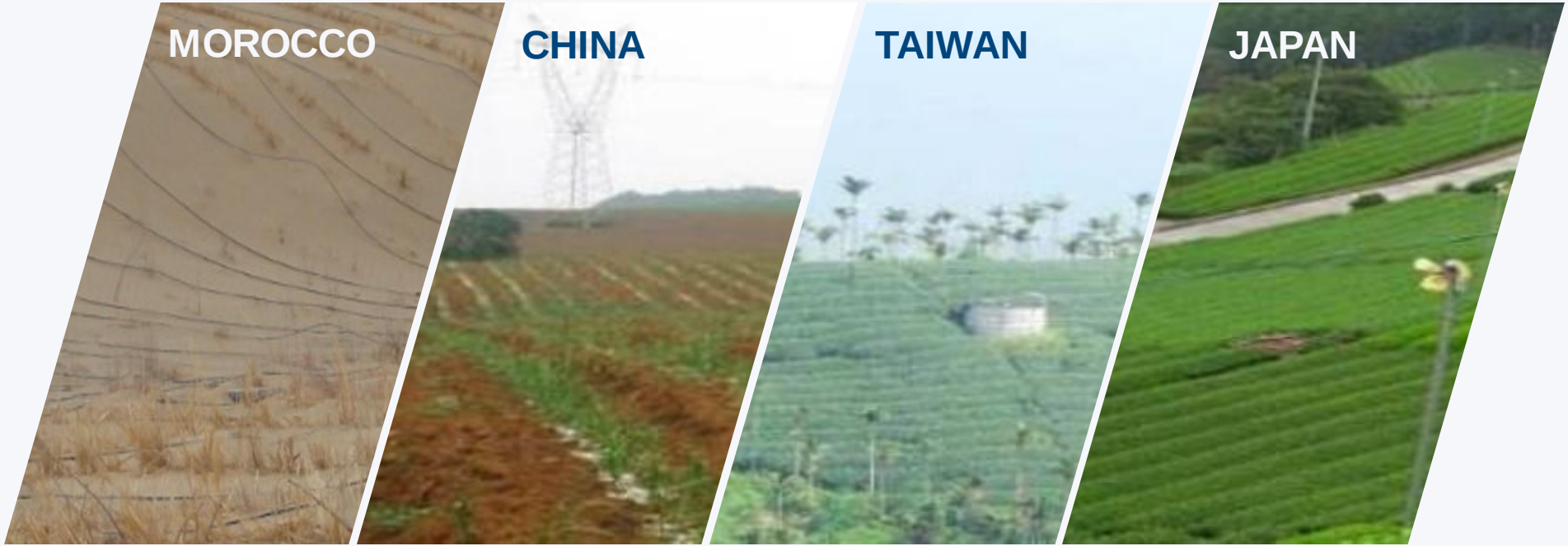
Disc on key

Drip Irrigation

We irrigate the plants, not the soil.
High uniformity.

Flood Irrigation – Water all over

Any topography.



LIMITED WATER AVAILABILITY

WILL IMPACT OVER 25% OF THE WORLD'S POPULATION

1.8 BILLION PEOPLE

The number of people that will live in areas affected by water scarcity in 2025.

Data based on World Bank Research 2012

Water footprint

- We need 50% of the water amount of Flood Irrigation
- We can double the yield in many crops
- We are 4 times water efficient
- We have no topography limitations

Climate change

Agriculture

German farmers hit by drought

Grain, fruit and vegetable harvests in Germany have been reduced by droughts. Regions in central Germany were hit hardest, suffering crop slumps of between 40-50%. The DBV calculated the total losses resulting from lower prices to be in the region of "more than 3 billion euros" ($3.3 billion) for German farmers.

European ‘extreme weather belt’ linked to worst drought since 2003

Severe droughts that stretched across a central European band this summer are consistent with climate models for a warming continent, experts say. Grain harvests in Germany have fallen 11% and apple harvests 21% on last year’s figures.

An aerial view shows dried out areas of the Rhine river in Cologne, Germany. Photograph: Henning Kaiser/EPA

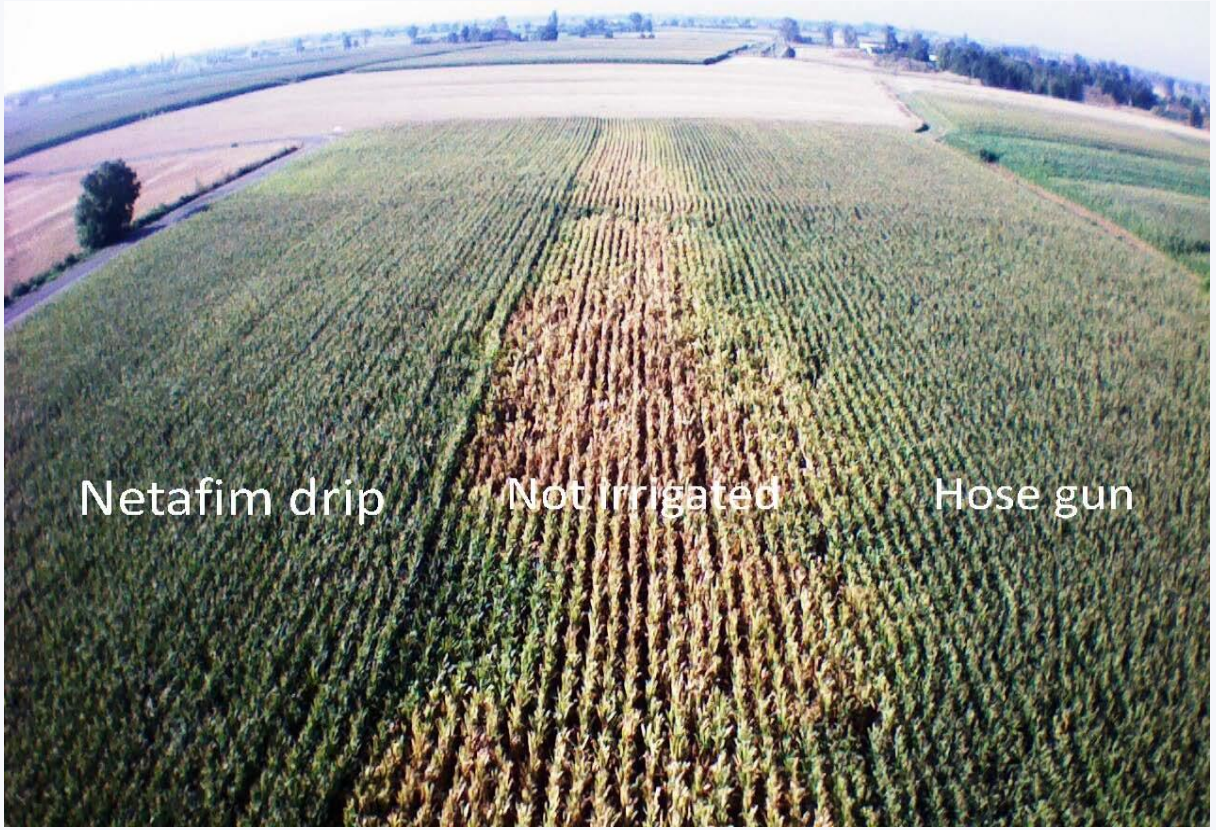
Climate change

Rain events are changing in Europe too.
We can’t count on the rain , we need an “Insurance Policy”

- Any processor, any food chain needs constant supply
- Potatoes crisis happened in Russia
- Dry summers hit Wine grapes production
- There is a climate change!

Common irrigation methods comparison

(In Europe)



Crops that were not irrigated usually

Potatoes

Sugar Beet

Crops that were not irrigated usually

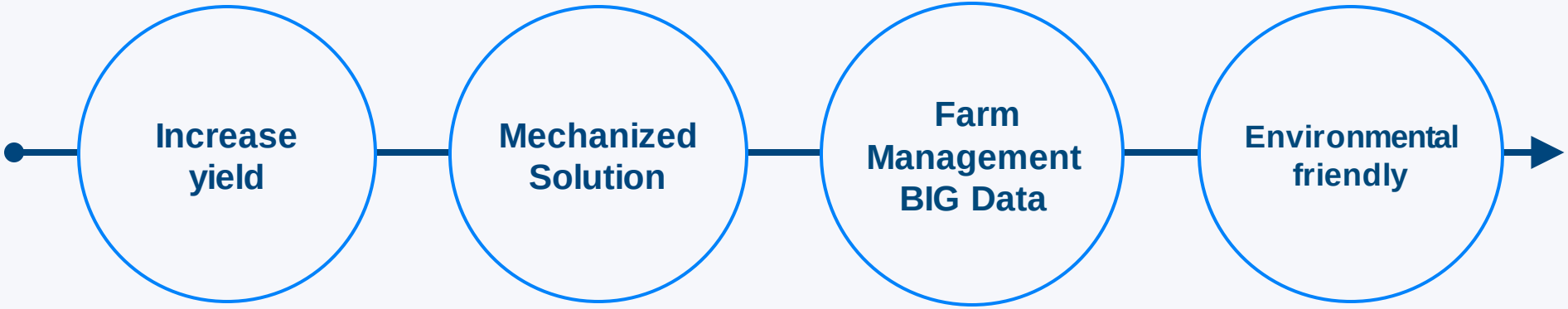
Wine grapes

Onions

DRIP IRRIGATION CAN ENSURE FOOD, WATER AND LAND SECURITY

Drip increases crop yield, quality and consistency, while using fewer resources, such as water and nutrients, per unit of land, to reduce relative costs

Overcoming the challenges



Increase yield

Maximize yield of basic food crops

Food security in 2050

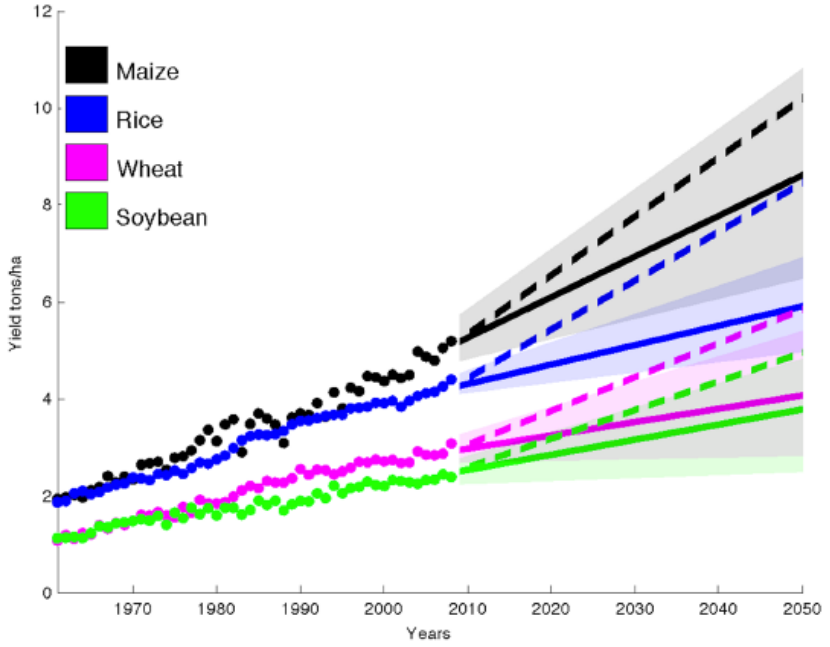
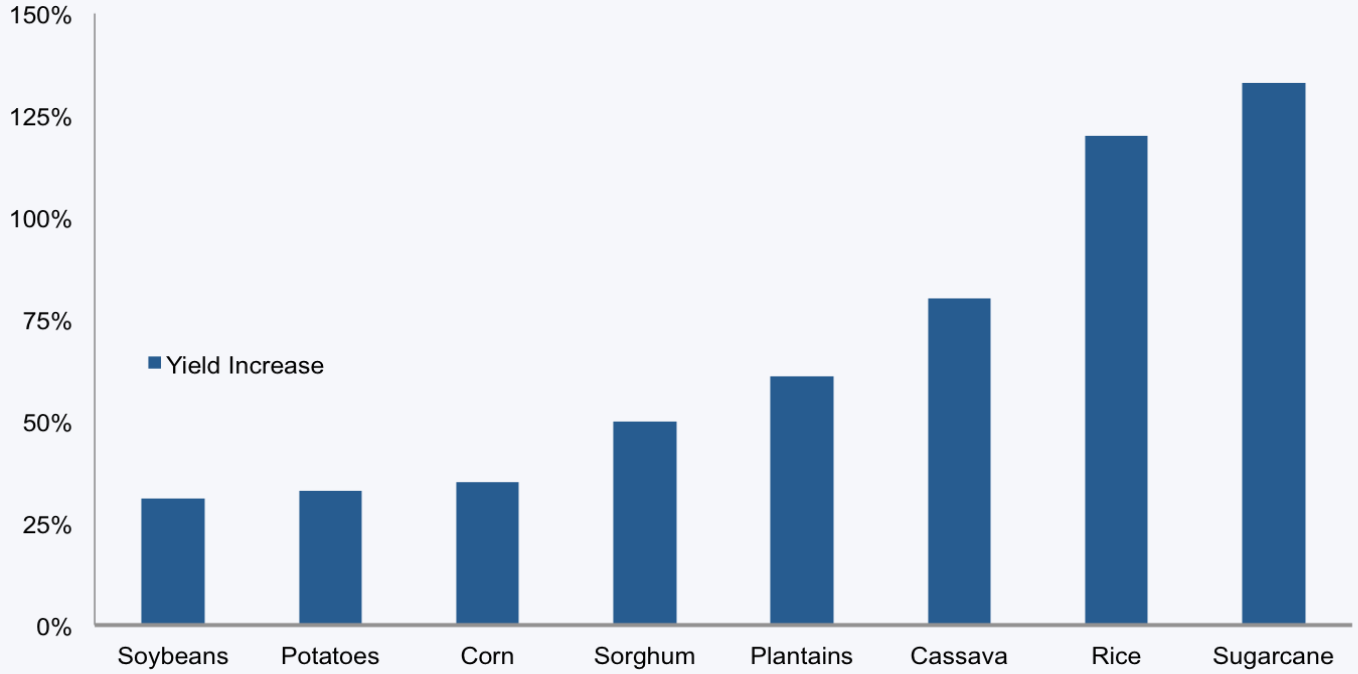


Figure 1. Global projections. Observed area-weighted global yield 1961–2008 shown using closed circles and projections to 2050 using solid lines for maize, rice, wheat, and soybean. Shading shows the 90% confidence region derived from 99 bootstrapped samples. The dashed line shows the trend of the ~2.4% yield improvement required each year to double production in these crops by 2050 without bringing additional land under cultivation starting in the base year of 2008.

doi:10.1371/journal.pone.0066428.g001

Yield increase with drip irrigation

Major crops



Source: Netafim Internal Research

How can we do it?

Look for the limiting factor:

- → Varieties
- → Water
- → Fertilizer
- → Plant protection
- → Fine tuning of all aspects

Rice – Variety test

Environmentally friendly irrigation

We irrigate the **plants,** not the soil

Global warming

High greenhouse gas emission

If you grow rice like this…

Gas emission – The impact

1 Ha Rice – Flood irrigated

Emits 470 Kg CH_4 = 11,700 Kg CO_2

Per growing season (4 months)

A passenger vehicle

Emits 4,700 Kg CO_2

Per year

1 Ha Rice = ~2.5 cars

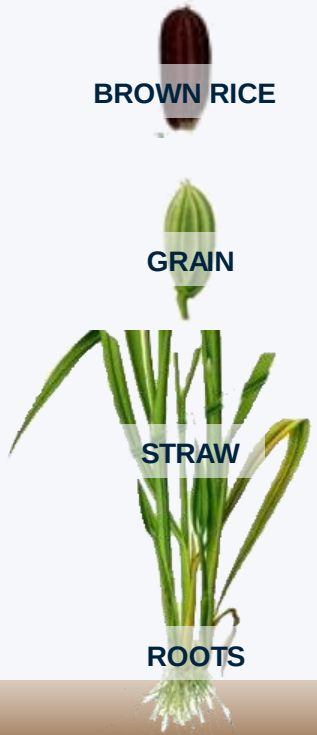
Converting 10% of global rice fields to drip irrigation is equal to the removal of 40,000,000 personal vehicles

Reduction of Arsenic uptake

NETAFIM™

Concentration (mg kg^{-1})

	Flooded		Drip
BROWN RICE	0.059 (±0.012)		<0.01
GRAIN	0.11 (±0.1)		<0.01
STRAW	1.53 (±0.47)		<0.01
ROOTS	23.33 (±7.79)		3.73 (±0.75)
SOIL			5.8



(Williams et al., 2007)

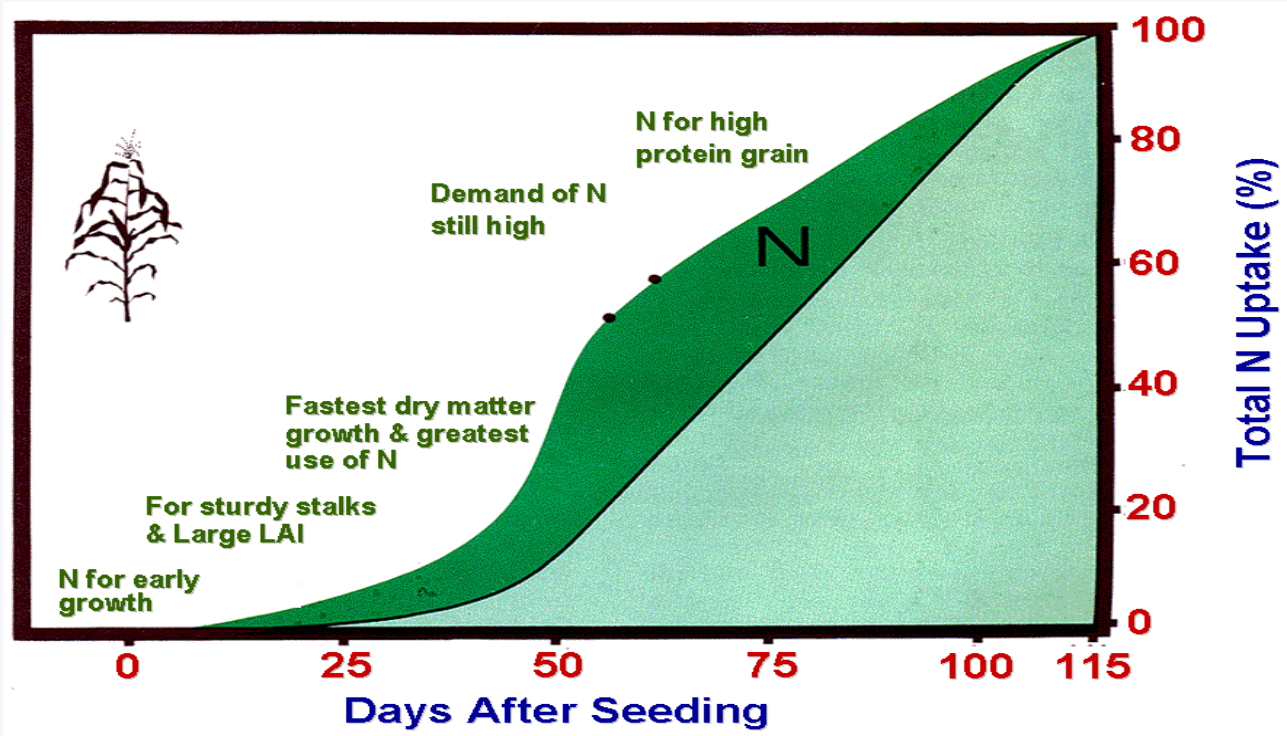
Ground water contamination: Nitrate leaching

- QLD, Australia – Hazard to the great barrier reef
- Mackay – Hazard to drinking water

How does it happen?
By placing big doses of Nitrogen fertilizers that are washed down by heavy rains or flood irrigation.

How is Drip different?

Teaspoon feeding, adjustment of the amount given according to the plant's needs.



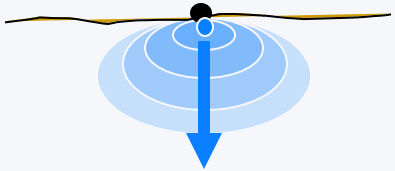
Environmentally friendly

How should we apply chemicals?

Spray from airplanes?

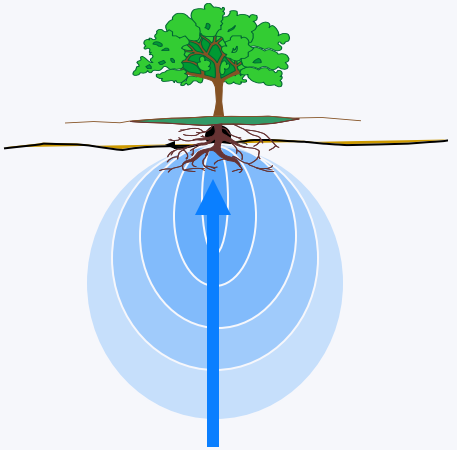
Or

through the root system?



Drip by Drip

Systemic chemicals, positive Bio Agents, Mycorrhiza



Drip as a delivery system

Why drip irrigation should be a strategic decision for sustainable off takers/ food chains.

- It is strongly reducing the water footprint.
- 4 times efficient than flood irrigation.
- It reduces significantly the carbon footprint.
- Avoids nitrate leaching and the contamination of ground water.
- Eliminates agro-chemical pollution.

Mechanized Solution

- Labor becomes an issue – availability & cost. that's why we need **mechanization**
- In general – the machines that seed / plant – should also inject driplines into the soil.

Mechanized Solution

Planting and inserting Drip Lines in one-Go

Mechanized Solution

Harvesting

Mechanized Solution

After Harvest

Farm management technology

- Monitoring and recording are crucial
- Farm management in real time
- Drip irrigation is helping create the next-generation farmer

Farm management technology

The next generation says – No

Farm management technology

Helping create the next-generation farmer

State-of-the-art developments such as online and mechanized agricultural solutions will enable farmers to fully manage and control their fields remotely by simply using any mobile device.

Better life farming alliance

Better Life Farming is a Global Alliance with Bayer ,IFC (a member of the World Bank Group ,(Netafim ,and Swiss Re Corporate Solutions to **provide holistic and innovative solutions for smallholder farmers in the developing world to enable them to grow their farms into sustainable businesses**

https://www.youtube.com/watch?v=b_ZUaqs_6Yc&t=26s

VIETNAM	KENYA	INDIA
Unlocking the full farming potential of Vietnam coffee smallholders		Bayer / Netafim / Yara / DeHaat / BigBasket / IFC

Better Life Farming

India

With partners we intend to offer solutions for the entire value chain

REMEMBER:
Every
Drop
Counts!

Thank You