ROOTS sustainable agricultural technologies Ltd.

Irrigation By Condensation (IBC) technology

Sustainable, year-round, water for irrigation systems to provide food production nutritional security

For small/medium holder farmers.

Presenter: Boaz Wachtel

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The Need & Potential

The demand for fresh water - urgent and critical political, social and economic issue in many countries.

Access for quality Irrigation water - major food production limiting factor.

Globally, almost 600 million smallholders experience hunger in the dry season.

Prevalence of undernourishment and of severe food insecurity (% of population) is 20.0%* globally.

The use of Irrigation By Condensation (IBC) systems:

- Will increase global food security, reduce hunger & malnourishment
- Will allow rural populations in areas suffering from water shortages cultivate the land, produce food and income.

Market potential is HUGE!

*FAO statistics http://faostat.fao.org/static/syb/syb_5000.pdf

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Executive Summary

Uniquely positioned

- Roots developed and commercialized disruptive technologies attracting significant attention in the rapidly growing Ag-tech investment community

Clear path to commercialization

- IBC proof of concept completed over 3 years and 9 major crops.
- The establishment of a marketing and logistics system will take place in the next 12-18 months

Market potential is huge – 500 millions systems globally , above 5 billion $

Potential partners

- Social impact investor, Investors who share the vision of providing food security and poverty alleviation , Financial investors / Philanthropists

Looking for $2.5M investment

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What is IBC?

Off-grid agriculture

1. Electric or Standalone, closed loop, solar-operated system
2. Irrigates crops at night by condensing air humidity on external surface of pipes with running (closed cycle) cold water
3. In many cases, no additional irrigation is required to maintain plant survival and harvest quality
4. Solar operated - Independent from water and electricity grids
5. Allows farming in remote locations normally unsuited to food production due to water shortages

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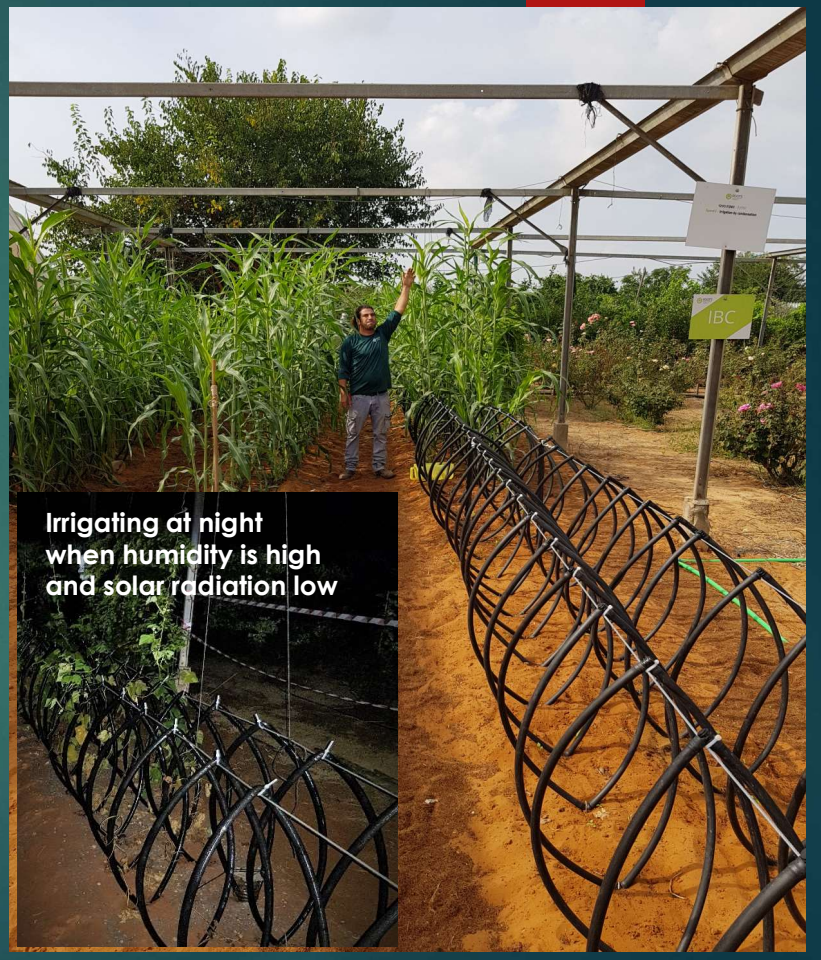
Irrigation by Condensation (IBC) technology

Humidity in the air is an infinite resource: a combination of medium & high Relative Humidity (RH) and air temperatures coupled with low water temperatures in blind pipes (circulated in closed cycle) generates large quantity of condensation water for irrigation. Cold condensate forming on the external surface of pipes flows by gravitation to irrigate plant's roots thus sustaining entire growth cycle from seed/clone to harvest for human and animal consumption. This is true for many crop types, in greenhouses and in open fields.



Irrigating at night when humidity is high and solar radiation low

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Technologies of the Month

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Irrigation Water Extracted from Air and Soil Moisture Through Solar Power

US Tech Discovery

By condensing water from the air and soil on chilled pipes, this invention attempts to alleviate both water and food shortage problems. It offers the ability to produce agricultural crops in most hot and humid climates by watering plants with condensation from environmental moisture, and by multiplying the number of crops that can be obtained per season. The production of condensation on pipes' surfaces irrigates the plants' roots, cools the roots, and accelerates the plants' growth.

The technology operates in remote areas, using solar energy alone and with a one-time filling of a water tank. Operating on solar powe (or on other energy where available), the system chills water in a tank; pipes extend from the water tank to and from rows of plants. Cold water is circulated through the imperforated pipes (irrigation pipes with no holes), producing constant condensation on the pipe's surface for consumption by the plants.

Irrigation by Condensation (IBC)

1 Solar, vertical

2 Electric grid, horizontal

3 Electric grid, vertical

4 Electric grid source

5 Solar/wind source

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Crop with IBC system - Examples

1 IBC system is suitable for up to 1 acre, it will enable food production and profit making for 8-16 families, depending on type of crop, price per kg etc'. The system is scalable and modular and price depends on types of crops and other factors.

1 IBC system can provide the yearly caloric intake for 40-80 people, depends on type of crop, age of people etc'

1 IBC system can save international food aid for 40-80 people.

Cost of 1 food ration per person is 0.61$*, therefore 1 IBC system can save 27,000 - 53,000$ of annual food aid

(0.61$*3 rations a day*365*40-80 people).

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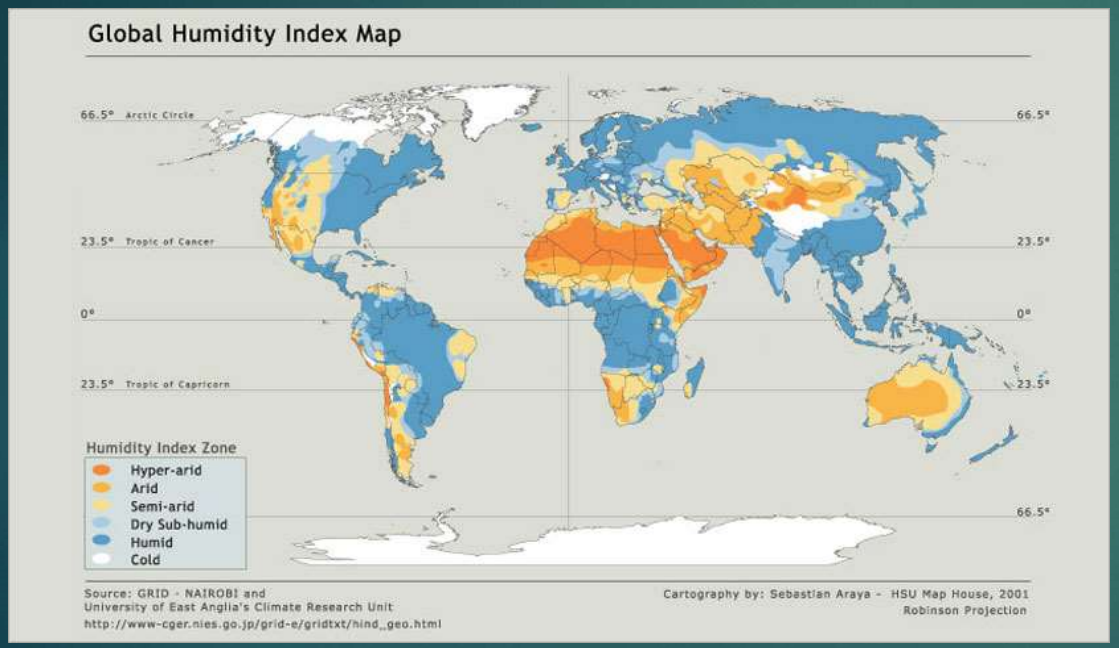
IBC is suitable for Most Important Staple Foods In The World

Rank	Staple Food	Share of Global Caloric Intake From All Sources
1	Maize Corn	19.5%
2	Rice	16.5%
3	Wheat	15.0%
4	Cassava	2.6%
5	Soybeans	2.1%
6	Potatoes	1.7%
7	Sorghum	1.2%
8	Sweet Potato	0.6%
9	Yams	0.4%
10	Plantain	0.3%

IBC can be used to grow any one of the staple foods mentioned here

Source: https://www.worldatlas.com/articles/most-important-staple-foods-in-the-world.html

IBC is suitable for food production, especially during dry seasons, in Dry Sub-humid, Semi arid and in Arid areas (up to 300KM from an ocean),



Water scarcity for food production affects many parts of the world: Sub-Sahara/Northern Africa, India, Middle East, South East Asia, Australia, Southern Europe, North Africa, Southern USA

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