

Water and Food

from



MultiGen and Dewponics

*Water from the atmosphere creates accelerated
Growth on food plants and water*

The Components are...

The World Environmental Solutions (WES) and DewPoint Systems' (DPS) complementary technologies generate water from the atmosphere (WES) and accelerate the growth of plants (DPS). The WES MultiGen system generates a cold working fluid that is recycled through chillers and passed over to the Atmospheric Water Generator, which is used to extract moisture from the air. Some of this water generated is used to chill the soil in the DPS DewPonics agriculture process.



Pictured is a WES - DPS system ready to set up on arrival at the site. The weather-proof cargo containers are ventilated and painted to reflect heat.

These systems are ideally suited for water-starved locations where there are inadequate sources of water to grow food crops sustainably. This system is fully climate change resilient, as water is obtained from a constant and secure atmosphere. Hot Houses in Cyclone/ Hurricane belts can now be protected in this weather-proofed, water supply and food growing system.

The Equipment



Each cargo container houses separate system components.

The first container is shipped with the generator equipment, MultiGen Chiller, and AWG. Once on-site the generator is removed and set up outside the container and connected to the WES chiller and AWG, which remains inside the ventilated container.

The second container is equipped with a water storage tank and a re-circulation tank, which doubles as a cold working fluid mixing tank that can be re-chilled and sent to DPS DewPonics system. Excess water made can be pumped elsewhere for other uses.

The third container contains the DPS DewPonics agriculture growing system of multiple-stacked reservoirs holding numerous planter trays. Overhead each rack, high intensity LED lighting pushes growth rates 24/7. The regulated cold working fluid flows through the racks, chilling each planter with soil to precise temperature, and is returned to the second container's mixing tank where it can be re-chilled as required before it is recirculated back to the planters in the third container. The circular motion uses a solar pump and gravity.

The Process

The diesel Generators electrical power is available for general use other than the WES-DPS system as the MultiGen only requires the use of the waste exhaust gas heat which is extracted in the Absorption Chiller process, and thus generates the cold fluid used to operate the Air Water Maker water continuing in a circular closed loop from chiller to Air Water Maker to chiller.



The Water now manufactured by the AWG is cold (5-8 C) and is pumped to insulated storage tanks in the second container. This water is then circulated through the DPS DewPonics agriculture floating beds in the third container and then back to the storage mixing tank in the second container. The circular motion uses a solar pump. The soil temperature is regulated by controlling the re-circulation of a maintained 5-8 C water temperature from the WES AWG and chiller.

The Use of Cold Fresh Water

The water now being circulated chills the soil in the floating planters and is optimised via a remotely-operated Supervisory Computer and Data Acquisition (SCADA) system to maximise controlled growth.

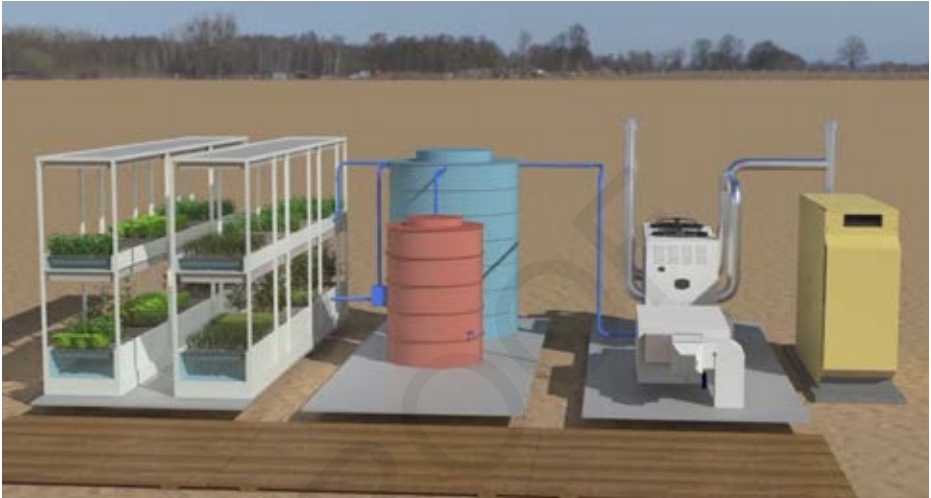
The Dew-point System's design in using the MultiGen has improved economics to diversify to portability by using the MultiGen water for root chilling, replacing the cold ocean water. This unique Water from the Atmosphere MultiGen system thus provides the cool temperature water previously found at 1800 feet off Hawaii. The plants are floating in soil-filled containers. The cool water temperature is transferred through the planters into the soil and roots of the plant. The water moves downward by gravity while this transfer occurs and is then pumped back to the storage tank.



The cool water temperature is being transferred through the planters into the soil and roots of the plant and is ongoing..

Copying Nature

The technology is based on what naturally occurs in the soil environment in temperate latitudes during the onset of the Spring season. The Spring soils are still cool from the last winter season, whereas the air temperatures are warming quickly as the sun's daylight period increases. A thermal differential between the root and leaf zone in plants is created and it is the thermal difference, when controlled, that can improve plant growth rates in warm, arid, humid, sub-tropical and tropical regions.



Over-view on how it's done without water irrigation:

Additionally, when the soil temperature is below the relative dew-point temperatures (60-75F) in these regions, the soil moisture is not lost through evaporation; in fact the soils can condensate moisture from the surrounding humid air, thus keeping them moist and reducing heat stress of temperate plants in warm humid regions. The container system creates a controlled Springtime growing condition. This is done 24/7/365 via the computer Supervisory Control and Data Acquisition (SCADA) program, an advanced LED lighting system, and chilled water from the WES MultiGen chillers and Air Water maker. The SCADA system precisely controls the planting medium temperature by regulating the WES MultiGen chilled water flow rate through the DewPonics™ growing system. The combination of the cool root zone and the warm leaf zone mimics the seasonal Springtime's temperate latitude environmental conditions where plants exhibit natural rapid growth. This allows temperate plants to be grown outside their preferred growing zones with accelerated rates and continuous crop production.

Additionally, a planting medium that is below the dew point temperature will condense water vapour onto it, providing self-irrigation. This eliminates evaporation loss and reduces the plant's heat stress. Additional irrigation, if needed, can be provided from the water stored in tanks generated from the WES Air Water Generator.

Conclusions:

The WES MultiGen system when combined with DPS DewPonics innovative agriculture system is truly a unique use of the WATER produced by MultiGen. This is hence a modular approach and is ideal for many regions that lack secure sources of fresh water, as it can be mobilised quickly and can be remotely supported via the internet.

Since the water temperature is used only during the growing season, the water manufactured can be used for traditional uses, as the growing system requires no access to freshwater sources. Additional water, when and if needed, can be supplied by the SURPLUS WATER produced by the WES MultiGen AWG system.

DewPonics system can grow temperate seasonal crops year-round in regions that often are compelled to import those crops which are not grown locally due to adverse environmental conditions or lack of water. This system only uses <5% of traditional cultivation methods.



What can be grown:

Over 100 Temperate plant species have been grown at the Natural Energy Laboratory of Hawaii (NELHA) using the root-chilling technology. This technology was first developed by the use of Cold Deep ocean water available to NELHA. The base technology has been refined and improved, broadening applications that are made possible with the adaptation of WES MultiGen AWG and chillers.

World Environmental Solutions Pty Ltd.(WES), Sydney Australia.

From Bill Straits Book "The Water Roulette" available on Amazon...

....."The likely world leader in this technology is an Australian company, World Environmental Solutions Pty Ltd, who pioneered during what in Australia was labelled the Millennium Drought: a 10-year affair in Australia in the early to mid 2000s. The result was a company that realised making water was desired as drinking water in many cases but the normal method was cost-prohibitive, with electricity costs soaring. One thing was a certain obstacle: the "Watts = Litres" formula. This company today is furthering research and development into its systems of water from the air using minimal power/electricity.

The WES water booster (WB) can double the RH at sites where normal operation of an AWG would be inefficient and not advised. That is, the WB can alter 20% RH into 43% RH prior to condensing or 40% RH into 83% RH prior to condensing. (Patent applied for.) This is a real issue for the Sub-Sahara, outback Australia and other arid areas that are on the fringe of optimal operational humidity levels.

WES also has patented its Hydro Gel filter system, which uses hydro gels impregnated into the filter material, to absorb moisture as air passed through it; as a small amount of electrical power was periodically applied to the filter sub-straight to "desorb" the moisture from the hydro gels. This pulsing effect resulted in water from the air with minimal energy usage.

WES mainstream development was in use of an air-cooled system known as a **MultiGen**. This consisted of a multi-patented air cooled absorption chiller and an air cooled AWM operated from free waste heat of a Turbine or reciprocating-generator exhaust. The by-product of this process is cool, air-conditioned air to a space, while making clean water, all operated from waste energy of an existing Generator, to activate the process they use to operate the condensing cycle. This process dramatically drops the use of electricity by some 95%, as the energy source is waste heat captured."

This particular company has a patented system using Hydro gel filters. These hydro gels have the ability to absorb moisture as the air passes through the filter impregnated with Hydrogel substance. Upon a small electrical charge the hydro-gel "desorbs" the moisture. This pulsing system can be used in front of most AC systems air intake and thus produce water for a very low cost and at very low RH normally necessary for AWG operation. While still in the R&D phase, prototypes are in operation as proof of concept.

DewPoint Systems LLC (DPS),Kailua - Kona,Hawaii

DPS has been operating as Limited Liability Company (LLC) registered in the State of Hawaii since 2014. DPS holds several technology utility patents: 1) Ocean Thermal Energy Agriculture (ColdAg™) (2006), 2) Atmospheric Water Generation (AWG), RainDome System™ (2010), 3) DewPonics® (US and PCT patent pending in countries; United Arab Emirates, Israel and Australia) (2018) and US Registered Trademark (2012).

DPS Founder/Owner Richard J. Bailey Jr. has background in petroleum engineering, industrial plumbing, aquaculture and holds university degrees in biology. Bailey has been intimately involved with the development and patenting technologies surrounding alternative uses of cold deep ocean seawater (4°C/39°F) since 1995, at the State of Hawaii, Natural Energy Laboratory of Hawaii Authority (NELHA). Bailey had the privilege to work with the founder of the NELHA and formerly the Chief Scientist for the US Navy, Dr. John P. Craven and Director of the University of Hawaii Sea Grant College Program, Jack Davidson. Craven, Davidson and Bailey co-patented the pioneering ColdAg® technology in 2006, which demonstrated that by chilling the root zone of temperate plants, with subsurface piping in warm humid climates, a thermal differential between leaf and root zones creates simulated Spring time conditions found in soils in temperate latitudes when plants exhibit rapid "spring growth".

Since 2010, DPS has focused its developments at NELHA to improve the energy efficiency of soil chilling. The resultant US/PCT patent pending technology, DewPonics® uses advanced remote sensors and control systems (SCADA) combined with an innovative modular design using planter trays filled with soil that float in a regulated cold fluid system. DewPonics® approach greatly improves thermal control, growth management and cost efficiency making it adaptable to many energy systems and regions worldwide. Containerised DewPonics® systems can be shipped to remote locations with rapid start-up.