

ORBTEK PTY LTD

MEA WATER MEASUREMENT RESULTS

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INTRODUCTION

Orbtek Pty Ltd is an Australian owned independent company responsible for the research and development of Intellectual Property (IP) for patented water devices that have a significant impact on the structure of water, and therefore on the health of all living species.

Devices currently exist in the market that restructure water using a mechanical vortexing method (eg: Clayton Nolte and World Living Water Systems Pty Ltd). The method devised by Orbtek is unique in that it uses a specific magnet configuration to create a natural, non-mechanical vortex. This method has significant improvements on the current devices available in that it creates a stronger negative charge of at least negative (-) 350 milliVolts, eliminates pathogenic microbes and allows for the charge to remain in the water indefinitely.

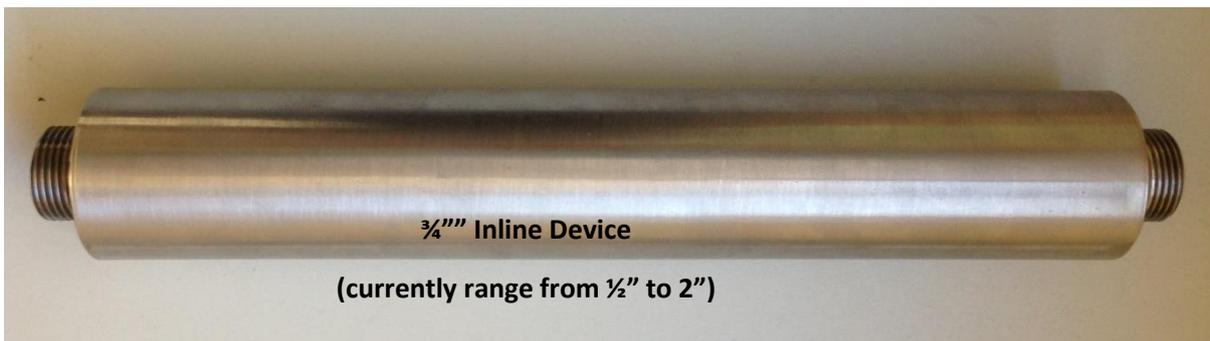
The devices have been made and tested in various sizes, suitable for personal use, home installation, small industrial applications and commercial farming. They are currently available for sale in Australia through a small-scale production facility based in New South Wales. The bottle top devices, used for personal drinking water and other liquids, have received a very positive reception in China.



**Apollo Bottle Top Devices in
Chrome and 24 Carat Gold**



**Iris Chrome Under Sink
and Shower Device**



**$\frac{3}{4}$ " Inline Device
(currently range from $\frac{1}{2}$ " to 2")**

TYPES OF DEVICES

Bottle Top Device

The **Apollo** bottle top device is marketed in Australia in 24 carat gold and chrome plated. This bottle-top device is sold with two bottles that have a design that facilitates the vortex in the proper form until it reaches the device. The device is a unique design that restructures the water in liquids to permanently hold a negative charge.

This charge produces life affirming qualities to the liquid that consequently increases liquid storage, enhances flavours, and eliminates any chemical/synthetic compounds/gases from the liquid. The bottle-top device is an ideal domestic appliance for conditioning drinking water, wine and any other liquid (eg. raw milk) that is primarily water.

This device has been successfully tested in China in the conditioning of water for herbal teas, and rice wine, and was enthusiastically received for domestic and office use.



Sink and Shower Devices

The **Iris** device (see chrome plated device below) is ideal for installation under a sink or attached to a shower. A significant number of urban residents worldwide live in apartments where this device is highly suitable for conditioning drinking and washing water, and has the advantage of being easily installed and removed without any impact on the surrounding fittings.



Iris Chrome device

Domestic, Industrial and Agricultural Water Devices

The other devices are designed for inline (water pipe) domestic, industrial and agricultural use. This includes devices with diameters of ½", ¾", 1", 1 and ¼" and 2". The ¾" is illustrated below.



These inline devices can be installed below ground (in the soil), and preferably in a horizontal position.

Considerable opportunity exists to improve the device design for a wide range of new uses. For example, business opportunities exist to invest into the development and production of larger water treatment devices, eg. 5", 10" and 15" diameter devices for waste water processing in large volumes, and the supply of drinking water for urban use.

This development could include trialling the more powerful Neodymium magnets in conjunction with the Ferrite magnets that are currently used in the inline devices. Orbtek's current production capacity is limited to devices up to 2" (inner) diameter.

The business opportunity for in-line devices internationally is considerable for a range of applications from industrial (general water use and some minor waste water treatment) to agriculture (including irrigation). The current Phion MEA water devices could be readily manufactured either within Australia or overseas and be available for marketing and use within 6 months from the transfer of the design specifications from Orbtek. In the early stages Orbtek could produce limited numbers of devices for trialling and measurement while a production facility is established.

MEA WATER DEVICE CAPABILITIES

The non-mechanical magnetic configuration has additional benefits that have not been experienced in the mechanical versions that are currently in the market.

- 1) Reduction of e-coli: Laboratory tests have been conducted to test for the reduction in E. coli (pathogenic microbe) in various waters and proved a 99.9% elimination of the pathogenic microbe species. These tests were undertaken independently in government accredited and approved laboratories.
- 2) Negatively charged water from these devices potentate any living system (eg. soil and plants). For example, the activity and function of soil biology is significantly increased, and soil water storage capacity improves. In the case of plants, the following has been observed and measured:
 - i. Viable seed germination is increased to nearly 100%
 - ii. Shorter growing period to maturity
 - iii. Nutrient uptake is increased by 2-4 fold
 - iv. Significantly decreased insect attack

- v. Significantly decreased plant diseases, including fungal attacks
 - vi. Fruit flavour is significantly increased
 - vii. Vegetable and fruit size can at least double without loss of flavour and texture
 - viii. Vegetable and fruit storage time is increased.
 - ix. Increases resilience to cold temperatures
- 3) A smaller version of the device designed to restructure drinking water, wine and juice and other liquids that are predominantly water, has also been found to enhance the quality of the liquids.

Trials with wine have produced significant results that include:

- i. Greater balance in wine structure
 - ii. Increased sense of flavours and aroma is intensified
 - iii. Considerably less tannin taste and sharpness (acidity) taste
 - iv. Potentially enhances the beneficial aspects of polyphenols
 - v. Wine does not oxidise and has been tested to last in high quality when open to the air for greater than 12 months
- 4) Water shows significant improvements:
- i. The water tastes softer and balanced
 - ii. The water has a lower viscosity (less friction or resistance on a surface) and is therefore better as a wetting agent
 - iii. The treated water improves biological and chemical oxygen demand (BOD and COD)
 - iv. Reduction of chemical toxicity in waste water, including septic water

RESEARCH AND DEVELOPMENT

Outline

Early research has shown significant potential benefits in treating water with the MEA devices. These include the removal of pathogenic microbes, treatment of waste water, conditioning of drinking water and the restructuring of water to a permanent negative charge to provide positive effects for human, animal and plant health. This also has the potential to revolutionise sustainable agricultural processes and advance the horticultural and viticultural industries. Tests detailed below are from both independent laboratories and independent tests from vignerons, horticulturalists, and in-house experiments. At this point no measurements have been undertaken at a molecular level (water structure) for MEA water as the cost of equipment (eg. electron microscope) or services (specialised laboratories) to undertake this work is prohibitive. However, this research work is planned once other funds are available in 2017.

Prior Research

Robert Gourlay's initial research for the design of a water unit commenced in 2003. This involved collaboration with people from Australia (inventors of magnetic and other water conditioning devices), Austria (Georg Gaupp-Berghausen) and Russia (Dr. Konstantin Korotkov whom he met in London in 2008). In 2008, he read the scientific papers of Dr. Mae-Wan Ho (London), her first book on the topic of structured water: *Rainbow and the Worm*, and her latest book *Living Rainbow H2O*. This led him to research by Dr. Martin Chaplin and Dr. Gerald Pollack's on Structured Water (2012).

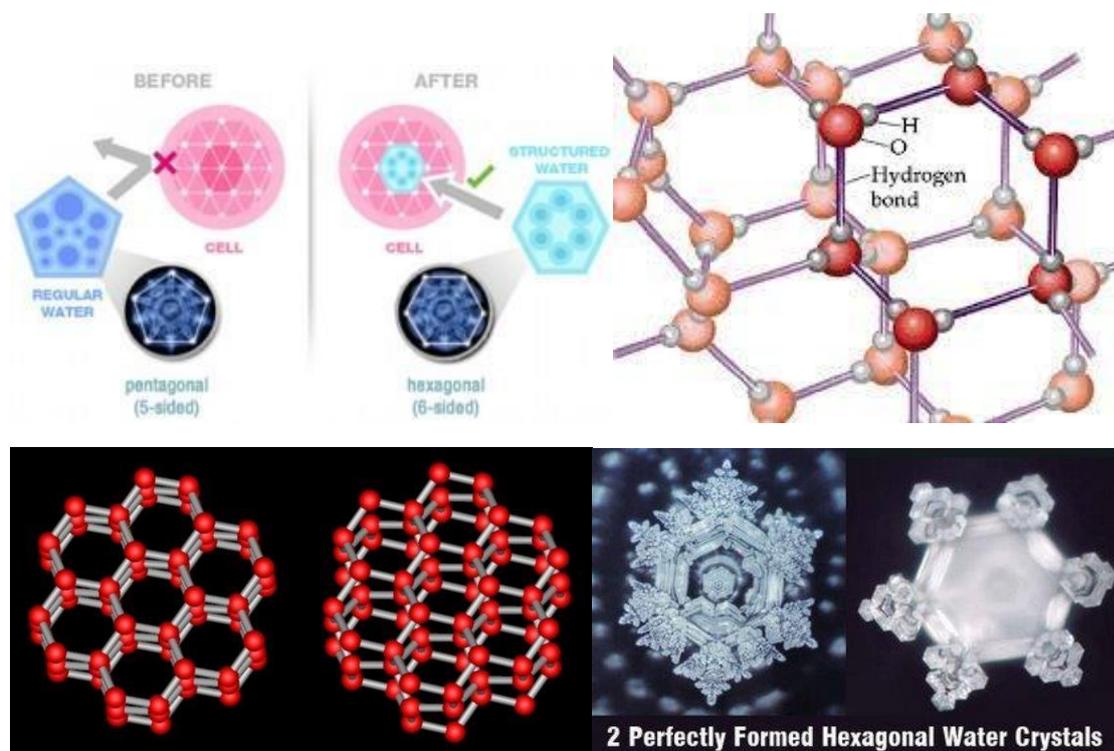
Since the 1990's, Robert Gourlay also studied the works of Victor Schauberg, Jacques Benveniste, and Paolo Consigli, whose book titled *Water, Pure and Simple* is a very good summary of water as a

unique molecule. There are many other water scientists who have *crossed the line* into water memory including Emoto, Schwenk, Vittorio Elia (including homeopathic solutions), Giuliano Preparata and Emilio Giudice. Robert has also extensively researched the subtle energy and geometry of life forms, from the works of numerous authors.

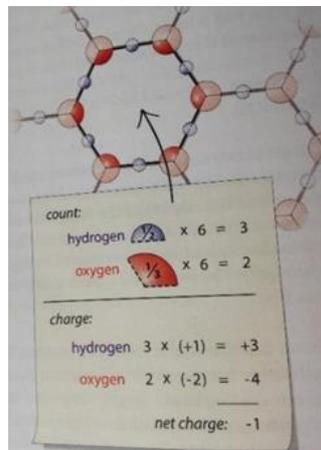
These people provide interesting insights into the energy, geometry and structure of water. However very few people have managed to apply this knowledge and invent water conditioning devices that turn positively charged (+) water from a still or stored state (the urban water that most people drink) back to its original natural state of negative (-) charge and keep it in this state for more than 2 days. Robert Gourlay achieved this result in September 2012, using a unique configuration of magnets and copper that took nearly 9 years to devise and test. Comparative tests were conducted on devices developed by others.

Dr. Pollack has made considerable progress in describing water structure, however he makes no mention in his books about magnetism as a method to change water structure, nor do most of the other scientists mentioned above.

However, it is known from work by Dr. Pollack and Dr. Chaplin that structured water changes from a 5-sided pentagonal to a 6-sided hexagonal, crystalline (lattice) structure. Below are images from the work of Dr Pollack and Dr Emoto (photograph of water crystals).



The negative charge generated by this hexagonal structured water is calculated as:



While this style of molecular level measurement has not been undertaken by Orbtek Pty Ltd to determine the presence of a six-sided (hexagonal) structure in the water, it can be assumed, at least for the time being, and based on facts produced by Dr. Pollack about the characteristics of structured water, that the MEA water devices produce a hexagonal structure for the following reasons:

1. The MEA water device produces a negative charge (voltage) and the negative charge is measured and is perpetual in the water and in storage
2. The MEA water eliminates most solutes and gases (eg. carbon, carbon-dioxide, toxic sulphides, etc.) from the water and wine solutions
3. The MEA water eliminates pathogenic microbes (eg. E. coli)
4. The MEA water potentate's biological activity and significantly increases nutrient uptake to plants
5. The MEA water structure enhances the flavours in herbal teas and wine.

Research – Waste Water Treatment

Tests were conducted on the treatment of household septic water by the MEA inline device. The results in the following tables are a comparison between waste water in a septic tank (Raw septic water) and water after it has been processed through a Phión magnetic (MEA) water conditioner. The conditioner in this case was a 2" inner diameter pipe device.

The purpose of the test was to measure the change in the chemical and mineral composition of the waste water after treatment with a 2" Phión magnetic (MEA) water conditioner device.

The water that is used for this household septic system has already been treated with a $\frac{3}{4}$ " MEA water conditioner and therefore the water that is used for flushing the toilets, showering, cooking, etc. is already conditioned with a MEA device. The primary source of the water is from a bore and from rainwater, generally in a 50:50 mix.

The major differences between the source (unconditioned) water and the raw septic water are:

Description	Measure	Source water	Septic water	% change
pH	mg/L	5.8	6.5	+12
Eh	mV	+430	-180	-142
Chromium	mg/L	<0.01	0.03	+200
Copper	mg/L	0.07	0.05	-29
Lead	mg/L	<0.01	0.02	+100
Manganese	mg/L	<0.01	0.13	+1200
Selenium	mg/L	<0.005	<0.01	+100
Zinc	mg/L	0.06	1.1	+1733

The source water also has very low conductivity (46 us/cm), slight iron (0.04 mg/L) and comparatively low alkalinity (14 mg/l), Calcium (1.7 mg/L), Magnesium (2.2 mg/L) Potassium (0.6 mg/L) Sodium (5.0 mg/L) and Chloride (7.0 mg/L)

The method for treating the septic waste water involved pumping 600L of septic water straight from the septic tank into a 100L IBC and then cycling this septic waste water through a 2" MEA water conditioner for a period of about 60 minutes. That is, septic water was pumped from the IBC through the MEA device and returned to the IBC. After about 30 minutes of cycling a dense white gas started to emit from the top of the IBC and continued for about 15 minutes. This gas is assumed to be a range of gasses comprising methane, sulphur, nitrogen, hydrogen, etc. Further tests of this process will be undertaken to test the nature of the gas.

The organic solids from the septic water settled to the bottom of the IBC and all septic smell was eliminated from the resulting water. The smell was not detected within 2 hours of starting this process and no smell was evident after 3 months.

The following table describes the comparison between the raw septic water and water after treatment through the MEA (magnetic) device. The chemical and mineral tests were undertaken by Sydney Analytical Laboratories on 17 September 2014.

Description	Measure	Raw Septic Water	MEA device results	% change	Standard Industry achievement	Comments
pH	mg/L	6.5	6.8	+ 0.7	NA	
Biochemical Oxygen Demand (BOD)	mg/L	730	460	-37	-20	Significantly better than most existing technologies
Chemical Oxygen Demand	mg/L	1310	470	-64	-20	Significantly better than most existing technologies
Total Organic Carbon	mg/L	340	265	-22		Significant change
Nitrate NO3-	mg/L	<0.01	<0.01	nil		
Nitrate NO2-	mg/L	2.9	1.1	-62		Significant change
Ammonia NH3-N	mg/L	61	69	+13		
Phosphate PO4	mg/L	69	35	-49		Significant change
Eh	mV	-180	-260	-44		
Total Suspended Solids	mg/L	800	87	-89	-50	Significantly better than most existing technologies
Arsenic	mg/L	<0.01	<0.01	nil		
Barium	mg/L	<0.1	<0.1	nil		
Cadmium	mg/L	<0.001	<0.001	nil		
Chromium	mg/L	0.03	0.02	-33		Significant change
Copper	mg/L	0.05	0.02	-60		Significant change
Lead	mg/L	0.02	<0.01	-50+		Significant change
Manganese	mg/L	0.13	0.12	-7		
Mercury	mg/L	<0.0001	<0.0001	nil		
Selenium	mg/L	<0.01	<0.01	nil		
Zinc	mg/L	1.1	0.24	-78		Significant change

Previous laboratory tests have been conducted to test for the reduction in E. coli (pathogenic microbe) in various waters after treatment through a MEA device. These tests were undertaken independently by government accredited and other commercial approved laboratories. The results include:

1. Comparison of water drawn from a creek and passed through a 1 and ¼" MEA device and the water drawn from the kitchen tap after passing through the device. The E. coli count at the creek was 250 faecal coliforms (cfu/100 ml) and was reduced to 2 at the kitchen tap outlet. This test was undertaken by laboratories at Southern Cross University (14 Nov 2013)

2. Comparison of waste water from a piggery and water after it had passed through a 2" MEA device. The waste water had 2,178 faecal coliforms (cfu/100 ml) and only 1 in the water once it had passed through the device. This water was tested by the Tweed Laboratory Centre of the Tweed Shire Council (12 Mar 2014)

Clearly, these results are significant, and while preliminary until further tests confirm this result with other smaller devices, these results indicate the capacity of the devices to restructure water into a coherent, life affirming and natural structure form.

Research – Spring Water Treatment

Orbtek Pty Ltd was asked by Beloka Water (Australia) to test ways to raise the pH of their still spring water for potential markets for alkaline water in the USA. Beloka still spring water has a pH (as measured by an Orbtek meter) of 6.5, which is about the pH of most natural waters. This water is listed in the top 100 fine waters of the world (***Fine Waters: A connoisseur's guide to the world of premium waters** by Michael Mascha*)

Orbtek used concentrated seawater to raise the pH.

1. Sample 1 had 1.9ml of solution (per 750ml) added and it raised the pH to 7.5
2. Sample 2 had 4ml of solution (per 750ml) and it raised the pH to 7.6
3. Sample 3 had added 1.9ml (per 750ml) to the water solution and was then vortexed using the bottle top device and the pH settled at 7.8.

Orbtek concluded that:

1. The MEA water devices have a significant effect on raising the pH of this water after alkaline (electrolyte) minerals from concentrated seawater were added.
2. There was no significant change in the taste of the water and the result was deemed acceptable for the market.
3. Seawater has every mineral known to man and has high electrolyte values (ie. very good for human health: see https://en.wikipedia.org/wiki/Water-electrolyte_imbalance) The negative voltage in the Beloka water after concentrated seawater was added raised the pH by 3 fold (ie. from 7.5 to 7.8), perhaps by making the alkaline minerals (Ca, Na, K, Mg, Rb, Sr, etc.) more bioavailable and increasing H⁻ (negative) ions in solution. **Note:** *pH is the negative logarithm of the hydrogen ion concentration: $pH = -\log [H^+]$ That is, a pH of 6 is 10 times more acidic than a pH of 7.*
4. Increasing the concentrated seawater solution above 1.9ml has no significant or added advantage for increasing the pH value to more alkaline.
5. The negative voltage from a 1 and ¼" MEA device that is planned to be installed at the Beloka bottling plant may increase the pH even more towards alkalinity with less input of the concentrated seawater solution.
6. For more information see: <http://www.seafriends.org.nz/oceano/seawater.htm>, and <http://www.traceminerals.com/trace-minerals/why-you-need-ionic-minerals>

Agricultural Applications

An opportunity exists in China through the China Biodiversity Conservation and Green Development Foundation (and other projects) to initially trial and then implement the MEA water devices in

agriculture (food production) and other green development projects. The common devices used in agriculture are the 1 and $\frac{3}{4}$ " and 2" devices.

Research by Orbtek since 2012 has demonstrated that the negatively charged water produced by the MEA water conditioner devices has a natural and unique association with microbes (eg. soil water, and the gut of animals and humans) in the transport of nutrients. That is, when negatively charged water is added to soil biology, the uptake of nutrients to a plant can be 2-4 folds greater. Orbtek has measured at least a doubling in food production.

For example, the images below of the vineyard (Half Moon Vineyard, Mongarlowe, NSW, Australia) show very healthy plant foliage albeit that they grow on very poor soils with low nutrient availability. The size of plant leaves trebled, and grape bunches doubled in size along with grape numbers. Consequently, grape tonnage doubled (from 5 to 10 tonnes) in 2015 due to the use of a 2" water conditioner and the application (fertiligation) of Orbtek soil biology (Catalyst) to the water.



Similar results have been achieved with other food types, eg:



The images above are of a beetroot grown with MEA (negatively charged) water and weighing 1.5kg and a bunch of table grapes also grown with MEA water and containing 375 grapes.

Below are other examples of root vegetables that have been grown with negatively charged water from a MEA water conditioner. These foods have high nutrient density (measured with a BRIX meter) and reached a size and quality (not woody in texture) that is evidence of the potential for

vegetables when grown with MEA water and Phión soil biology. The image on the right shows that when cabbages are grown with negatively charged water there is little or no insect attack.



Food production is an integrated approach that combines negatively charged water, beneficial soil biology (added as an inoculant) and the use of compost (including organic waste recovered from waste water treatments).

Some trials on the use of MEA water from the bottle top device to water roses have been undertaken by Mr Victor Yu and Mr Heug (Ringo) Mok. Mr Mok sent the following photographs to Orbtek to demonstrate that the size and health of the roses increased considerably after application of the MEA water.

These results are consistent with measurements and observations by Orbtek with flowers, fruit and vegetables since 2012. In all cases a plant increases its potential to express size, nutrient density, form and health (disease free) when watered with MEA water, and this potential increases when biology (and carbon in the form of compost) is added to the growing area.



Clearly, there is an opportunity to use the MEA water devices in a wide range of applications in China, including flower production, viticulture, horticulture, vegetable production, etc. to increase food and plant health in a manner that is largely disease free and nutrient dense.

Other opportunities will exist with the use of Phión soil biology. In the illustrations on page 13 there is a comparison of a portion of a paddock comprising pasture grasses before and after treatment with Phión biology (including copper sulphate to improve copper deficiency and the uptake of phosphorous)



After treatment with soil biology

Before treatment with soil biology

The irrigation of crops and pastures with negatively charged water will always improve production results. Similar production results can also be achieved with forestry.

Application of biology through a venturi to a MEA water conditioner

This scheme (described below) can be used in small to large scale operations of water and biology delivery to plants and soil. Further details on the installation of the MEA water devices are in the Paper titled: ***Installation of the MEA Water Devices.***

The venturi (see image on next page) is installed prior to the input end of the MEA water conditioning device and at least 1m (metre) before the inlet of the device.

The venturi is attached via a plastic hose to the tap of the container that holds the biology. This container would be mounted at least 1m (metre) above the ground to provide sufficient head of water flow to the venturi. The tap on the container controls water flow (on or off) to another inline tap (on the hose between the venturi and the biology container) that regulates the rate of water flow (ie. drops per minute: 20 drops equal 1mm of volume) to the venturi/MEA water device, and hence to the soil or plant.

This set-up was installed in a Chilli trial in Handan, China. The purpose of the trial was to test the increase in Chilli production using MEA negatively charged water and Phi3n developed soil biology. The biology was feed into the water line via venturi before the water conditioner device (see images next page)

The trial involved two (2) plots with one plot as a control (no MEA water and no biology applied) and the other plot of equal number of plants had MEA water and biology applied.



Water in this end of a venturi

Water flow rate regulator. If the venturi is buried underground, then the regulator can be repositioned above the ground by inserting a plastic hose between the venturi and the regulator
This filter is only required if the biology is drawn from an open container, eg. bucket

Water through the venturi flows from the short end of the venturi (as shown above).



The image above shows the venturi installed in line with the MEA water device at Handan, China. The system is tested prior to covering in the trench of the system to be buried.



The image above is the MEA water conditioning device showing the input end, marked with a red label (**Water Input This End**)

The trial results were measured by weighing and comparing the Chillies from each trial plot. The plot where the MEA water and the biology was applied **produced 5 times the weight of Chilli compared to the control plot**. Also, the plot with the MEA water and the biology produced:

- Plants with harvestable chillies two (2) weeks before the control harvest started and two (2) weeks after the control plot had been fully harvested.
- The plant sizes were larger (see image below)
- The taste of the chilli was greater or more amplified.



These tests are being repeated in over 50 trials in a range of climate zones in China during 2017-2018.