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INDENSER OPERATION

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Abstract

The process by which plants can directly obtain water from the atmosphere other than through rainfall and condensation is illustrated by the operation of several devices. These indensing devices take various forms with some emulating the design of dew ponds and air wells. The occurrence of indensation is illustrated and the general conditions for the indensation identified.

Introduction

Tunstall[1] identified that plants have the capability to directly acquire water from the atmosphere other than through rainfall. This concept was introduced using observations on the occurrence of plants, and the existence of dew ponds and associated air wells.

The direct acquisition of atmospheric water by plants was labelled ginspiration, and the process indensation. Devices that directly acquire atmospheric water are then indensers. It appears that all plants are indensers, but that some are better than others. Also, the relative amounts of water used by plants deriving from rainfall and indensation are not constant and appear to depend on the form and condition of the plants as well as the environmental conditions.

This note illustrates the occurrence of indensation by summarising the initial stages of the development of constructed indensers. Discussion on the mechanism will occur elsewhere as that involves consideration of some basic physical constructs, and an introduction to a 'new' energy field. The indenser response relates to a structured energy field that pervades the earth and likely the universe. This is termed the perfield in being all pervasive.

The presentation of the information on indensers at such an early stage of development arises because of the importance of the mechanism for global warming. Such information would normally be withheld until the performance of the indensers could be tested under a comprehensive range of environmental conditions. However, practical constraints currently limit the detail of observations such that only some aspects of the optimum atmospheric conditions are known. Despite this, it is clear that the indensers are acquiring water from the atmosphere other than through rainfall or condensation. The results provide proof of concept.

The details given are not designed to allow others to produce such results, although historically others have. This arises because of the number and nature of considerations that must be taken into account in constructing indensers. Many of these considerations will be addressed in a manual on the design and construction of responsive devices where the indensers represent a

[1] Tunstall BR, 2009. Issues Concerning Mechanisms for Global Warming on www.eric.com.au

special case. The nature of the perfield will be addressed separately and in stages due to its complexity.

Indenser Development

Phase 1

The first phase of indenser development involved the construction of devices from selected rocks. While many forms of rock can be used some are considerably better than others. The characteristics of the rock important for their functionality as indensers do not relate to rock type by way of geological development, and there is currently no simple way to identify them.

The first indenser (Fig. 1) was modelled on the segment of a pineapple fruit that contains the flower (Fig. 2) as the pineapple appears to be an excellent indenser. However, this device was difficult to construct and evaluate, and scaling up would involve the construction and assembly of multiple units.

The detailed shape of the second indenser (Fig. 3) reflects the particular rock fragment used, but the basic form is reflective of bivalve molluscs. The shape incorporates a well for the collection of water.

The shape of the third indenser (Fig. 4) was based on Zibolds air well (addressed in Wikipedia and elsewhere on the WWW), but with the shape corrected to give an appropriate response. This shape was chosen from a broad range of options because it naturally provides a well. It is referred to as a dimple.

The indensers were installed on a mound of earth that had been dumped on a path composed of fired clay pavers. The pineapple and dimple were pressed into the wet surface while the mollusc was 'planted' with its base in the soil. Good contact with the earth appears essential.

For operation small amounts of water were placed in the wells. For several weeks there were no obvious gains of water by the indensers, but on occasions they retained water longer than expected for the conditions. However, on a heavily overcast day all indensers gained water at around 10am when a strong wind developed. At 9am the dimple was almost dry but had filled to a maximum depth at 10am.

The pineapple only gained water until the hole was full[2]. The mollusc and dimple only gained water until the well became around 1/3 full by depth, but the surface of the stone became wet well above the level of the water. With the mollusc the wetted surface extended over the front lip of the well and to a greater height at the back.

The mollusc and dimple were indensing in conditions that were evaporative due to a strong wind with the rock surface being wet well above the level of the water. There was no such wetting of the rock surfaces with condensing conditions in the early evening with no sunlight, no wind, and reducing air temperature. Under condensing conditions there was an abrupt change from dry rock to water in the well.

No quantitative information was obtained that identifies the relative performance of the different devices. However, their relative performance appeared to be related to size, which is to be expected when all else is equal.

[2] Observations on the small well in the pineapple emulation were very difficult so no emphasis is placed on them.

Phase 2

The phase 1 indenser designs were limiting because of the design of the wells. These had a small capacity when some water appears necessary for them to operate. Also, there is a maximum level of water accession[3], as arises with dew ponds (accessions through rainfall excepted). The issues involve the difficulty in maintaining a small amount of water in the wells throughout the day, and the reliable determination of small changes in water depth: the difference between the seeding condition and full capacity could be small. The most obvious indication of indenser operation with phase 1 indensers was the wetting of the stone above the water level in the wells.

The phase two designs resolved these issues by providing drainage while maintaining a small amount of water in the indenser. Drainage was via a central 6mm diameter hole or stainless steel tube connected to flexible PVC tubing. The retained depth of water was between 5 and 10mm.

The fourth indenser was developed around the design of ancient air wells. It comprises two parts, a base designed to provide good contact with the earth (Fig. 5), and a top section that produces the indensation. While these components are separately identified they combine to produce a functional unit. The construction of the base is as important as for the top.

The base of the air well was cast from concrete using selected sand, gravel and cement. Two arrangements were tested for the top section, the first with polished, flat, 30 to 50 mm quartz stones laid flat in the well. This configuration emulates one form of construction of dew ponds. The second was as for the first but with rounded, mainly quartz stones added to form a mound (Fig. 6). This configuration emulates historic air wells constructed from mounds of smooth rounded stones.

The fifth indenser was constructed from a 0.5m length of 100mm diameter PVC pipe with acrylic caps top and bottom. This was first filled with the table tennis balls filled with conditioned water, and then with selected polished quartz stones. This configuration represents a simple design developed by addressing the basic requirements.

The phase 2 indensers were 'planted' in the earth mound used previously for the phase 1 observations. Apart from convenience, the location was selected because of the prior growth of two parsley plants in a shallow depth of otherwise bare clay subsoil lying on top of clay pavers. This growth occurred under drought conditions such that the plants received very little water through rain. The plants never showed any signs of water stress but had a toughened appearance deriving from reduced leaf size and a prostrate form compared to well watered plants (Fig. 7).

All phase 2 condensers produced water at night or heavily overcast days given a strong breeze. However, they have considerable dead volume and their operation is most readily observable by the collection of water within the indenser rather than by drainage from them. With the pipe indenser this is most apparent on the inside of the cap (Fig. 8). The water appears attracted to the acrylic such that large droplets form to the extent of traversing an 8.5 mm (Fig. 9) and smaller holes.

During indensation large droplets form on the polished stones of the air well (Figs. 10, 11), and these occur when all other surfaces in the vicinity are dry (Fig. 12). However, evaporation

[3] This likely arises because the collected water forms part of the indenser and above a limit the collected water changes the effective shape of the device and nullifies its response.

exceeds any indensation in sunlit conditions. In the initial configuration the rocks were dry under sunlit conditions even with high humidity and wind.

On one occasion under moderately indensing conditions some of the stones in the well indenser were saturated with large drops of water while others were dry (Figs. 13, 14). There was a fundamental but obscure difference in nature between the wet and dry stones. Re-selecting the stones to use only those with the high response greatly improved the performance of the indenser despite the quantity of stones being insufficient to produce the desired size of mound.

Building the mound to an appropriate height with the most appropriate stones further improved the performance. On one day with regionally strong winds (locally gusty) the stones remained wet from indensation until 10.30am on a sunny day.

Water collects on the external surface of indensers under condensing atmospheric conditions as it does on any other surface. This is as a fine film of very small droplets. With the pipe indenser the condensate is on the outside of the acrylic cap and not the inside as occurs with indensation.

The dead volume in the indensers arises because the balls or stones become fully wet before dripping water into the well, and because surface tension effects make the height for the initiation of drainage higher than for the drained level. It appeared that considerable indensed water was evaporated during non-indensing conditions.

Relative performance

The relative performance generally follows the development sequence. The main exception is that the quartz stones selected for the pipe indenser did not perform as well as the water filled table tennis balls. Given the gains made in such early stages of development, and the factors yet to be investigated, substantial further gains are expected. The general performance sequence is:

1. well with second selection of mounded quartz stones
2. well with second selection of flat quartz stones (dew pond emulation)
3. pipe with water filled table tennis balls
4. well with first selection of rounded stones
5. well with first selection of flat stones (dew pond emulation)
6. pipe with first selection of stones
7. mollusc
8. dimple
9. pineapple segment

Discussion

Initially water only collected in the indensers given high humidity and a good wind but with improvements indensation occurred in a gentle breeze. While these conditions are evaporative they combine to minimise limitations to the flow of water from the atmosphere to indenser. The high humidity minimises the concentration difference between the indenser surface and the atmosphere, while the breeze serves to minimise the path length and hence resistance to water flow. However, as these observations were restricted to one location during a few months they are restricted to a very narrow range of conditions.

An observation made by others in relation to constructing dew ponds, that bigger is better, likely applies to all indensers, hence the small experimental size of the indensers is counterproductive to obtaining a good response. The location of the devices for the observations represents a further limitation. The location used was not ideal because of the proximity to tall plants and sheltering from the wind. Additionally, the spatial structure of the perfield means that some locations are better for indensing than others. There will be marked differences in performance depending on location.

Positive results were obtained for all indensers despite the limitations, and addressing the limitations should provide improvements in performance. Gains can also be made in other ways. For example, from tests on other indensers it is known that gains can be made by improving the shape and finish of the stones.

The results identify the existence of indensation as a physical process. Such a process would be expected to have general applicability in the growth of plants, and this accords with observations on the occurrence and growth characteristics of different plants and vegetations. The process therefore has profound implications for land management and agriculture, and is likely central to global warming.

Fig. 1 Indenser constructed from stone to emulate a pineapple flower segment. 80mm wide

Fig. 2 Pineapple flower segments whole (left) and sectioned. The section shows the cavity that has a narrow opening that is normally covered.

Fig. 3 Indenser constructed from stone. The shape generally reflects a bivalve mollusc but with an external well. 300mm high.

Fig. 4 Indenser constructed from stone (dimple). The shape represents a corrected form of Zibolds air well. 120mm wide.

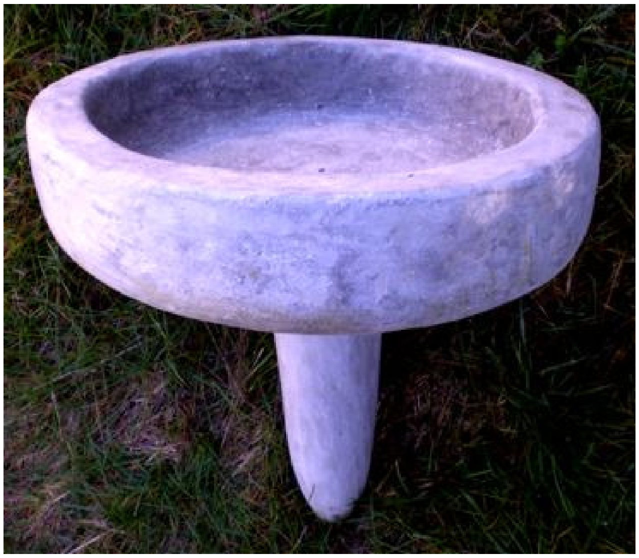

Fig. 5 Concrete structure constructed from selected gravel to provide the base section to an air well. 0.4m diameter.

Fig. 6 Air wells 'planted' in an earth mound.
The concrete base section is filled with polished mainly quartz stones. The 0.1m diameter, 0.5m long plastic pipe contains table tennis balls filled with conditioned water. Both structures have drainage tubes arranged to maintain around 10mm depth of water in their base.

Fig. 7 Self germinating flat leafed parsley plant that had grown on the earth mound the prior season under drought conditions of virtually no rain.

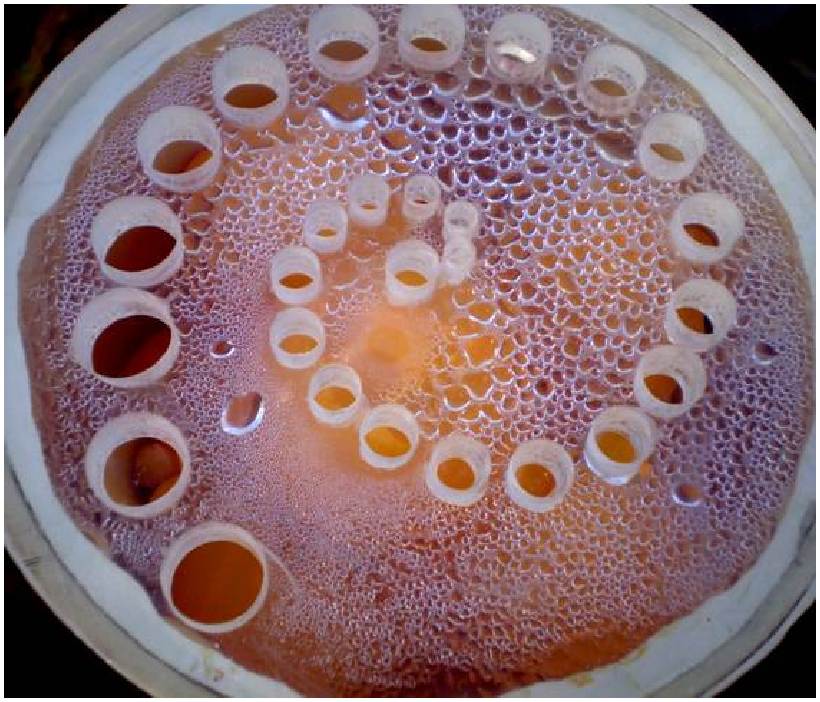

Fig. 8 Top of the pipe indenser when it is functioning.

Fig. 9 Close up of the pipe indenser when functioning showing the collection of water in a 8.5mm diameter hole.

Fig. 10 Condensation on the polished quartz stones of the air well indenser when functioning. Fully sunlit.

Fig. 11 Close up of the condensation on the polished quartz stones of the air well indenser is functioning.

Fig. 12 'Control' for Fig. 10 of residual stones from constructing the indenser lying in shallow water in a deep stainless steel pot. Mostly shaded and all sheltered from wind. .

Fig. 13 Well indenser showing collection of water on some stones while others are effectively dry.

Fig. 14 Close up of differential water indensation on stones.