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FOOD FOR THOUGHT

By: Maissa Azab

This year 2015, we have chosen the overarching theme of "Bare Necessities". Naturally, food is a major bare necessity, without which life ceases to exist. Not only is food a necessity of life, but its quality also determines the quality of our life.

As all food comes from the soil, whether directly in the form of plant products or indirectly in the form of cattle and poultry that feed on plants, a healthy soil is the way to a healthy life. That is basically why the 68th United Nations General Assembly declared 2015 the International Year of Soils (IYS).

The Food and Agriculture Organization (FAO) of the United Nations has been nominated to implement the IYS 2015 within the framework of the Global Soil Partnership and in collaboration with Governments and the Secretariat of the United Nations Convention to Combat Desertification. The IYS 2015 aims to increase awareness and understanding of the importance of soil for food security and essential ecosystem functions.

In this issue, we tackle some issues related to the necessity that is food, and its main source: agriculture. Each is a huge subject that no one can ever cover entirely. We have thus made a selection of a few interesting subjects. Among them, we discuss the possibility of farming in outer space, ancient Egyptian cuisine, safety and health in agriculture, growing farming problems, as well as farming advances and new technologies.

That is all in addition to the valuable contributions of Dr. Khaled Elsaadany, Executive Manager of Grants, Innovation and Technology Transfer Center; Dr. Mohamed Soliman, Director of the Bibliotheca Alexandrina (BA) Manuscripts Museum; and Mr. Gamal Hosni, Director of the BA Art Exhibitions and Collections Department; as well as the artwork of Mr. Mohamed Khamis, Deputy Director of the BA Art Exhibitions and Collections Department. Finally, you must not miss the final episode of the Sci-Fi series "The Human Civilization Enigma" by Dr. Omar Fikry, Head of the BA Planetarium Section.

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FOOD AND AGRICULTURE

By: Dr. Khaled Elsaadany

Executive Manager of Grants, Innovation and Technology Transfer Center
Coordinator of the Egyptian Network of Innovative Technology (ENIT)

What is agriculture? It is the cultivation of animals, plants, fungi, and other life forms for food, fiber, biofuel, medicinal and other products used to sustain and enhance human life. Agriculture was the key development in the rise of sedentary human civilization, whereby farming of domesticated species created food surpluses that nurtured the development of civilization. The history of agriculture dates back thousands of years, and its development has been driven and defined by greatly different climates, cultures, and technologies.

Agriculture contributes to the economy through provision of food, employment, raw materials for industries and foreign exchange. There are many problems that agriculture faces; such as poor crop, animal husbandry, lack of capital, poor storage, physiological and sociological factors, pests and diseases, and land use.

Foods are classified into different groups according to their nutrient content (macronutrients and micronutrients). The body needs macronutrients—proteins, carbohydrates, fats, and oils—in large amounts; while it needs micronutrients—vitamins and minerals—in small amounts. Most foods have a mixture of the two kinds, yet with percent discrepancy between both.

The human and economic costs of food insecurity are enormous; currently, 925 million people suffer malnutrition and food insecurity. In other words, nearly one billion people are permanently suffering from hunger. Malnutrition alone causes the death of 2.6 million children every year; one in seven children worldwide are underweight, down from one in four in 1990. A child below the age of 2 years suffering from hunger will experience stunting—their mental and physical capabilities will be damaged for life, affecting their prospects of future employment and general well-being.

The Millennium Development Goals defined by the United Nations include eradication of extreme poverty and hunger. Now, they are working on developing Sustainable Development Goals including eradicating hunger, achieving food security and improved nutrition, promoting sustainable agriculture, and ensure availability and sustainable management of water and sanitation for all.

Global demand for food is estimated to double by 2050. Urbanization and industrialization will lead to decrease the natural resources needed for agriculture and fisheries, such as land and water. To improve sustainable use of natural resources and productivity growth, we need

to utilize innovation tools and sustainable management. This would help humanity meet the increasing demands and ensure that the global food system provides adequate supplies of high quality food,

Adoption of the green growth and the effective food chain concepts can prove remarkable benefits as well. Green growth means enhancing economic growth while reducing pollution, greenhouse gas emissions, wastes, and maintaining natural resources and biodiversity. Achieving an effective food chain, on the other hand, can contribute substantially to sustainable growth and food security, and pave the way for less pressure on marine and land resources.

Moreover, ensuring food safety contributes to consumer protection and public health. Effective food safety from “farm to consumer” plays a role in safeguarding the health and well-being of people and to fostering economic development and improving livelihoods. FAO and WHO are key international leaders in the development of global food safety initiatives and translating these into country level action.

Addressing the challenges of food and agriculture is a matter life or death to humanity. It requires extensive research and implementation of innovative and sustainable practices. Last but not least, international organizations should provide special care and exert more efforts to assist poorer countries in this regard.

EXTRATERRESTRIAL FARMING

By: Shahenda Ayman



With ongoing man-made and natural calamities hitting our home, Earth, scientists are working on several projects that aim to find other planets suitable for life. Mars, for example, probably had liquid water on its surface and could one day become our new home!

Two Researchers, Giacomo Certini and his colleague Riccardo Scalenghe, at the Department of Plant, Soil, and Environmental Science, University of Palermo, Italy, recently published a study in the Planetary and Space Science journal, claiming that the surfaces of Venus, Mars, and the Moon appear to be suitable for agriculture.

On Earth, five factors work together to form soil: the parent rock, climate, topography, time, and biota—the organisms in a region such as its flora and fauna. This last factor is still subject to debate among scientists: “Most scientists think that biota is necessary to produce soil,” Certini said, “Other scientists, me included, believe that important parts of our own planet, such as the Dry Valleys of Antarctica or the Atacama Desert of Chile, have virtually life-free soils. They demonstrate that soil formation does not require biota”.

The researchers claim that classifying a material as soil depends on weathering. According to them, a soil is any weathered veneer of a planetary surface that retains information about its climatic and geochemical history. On Venus, Mars and the Moon, weathering occurs in different ways.

Venus has a dense atmosphere at a pressure that is 91 times the pressure found at sea level on Earth; it is mainly composed of carbon dioxide and sulphuric acid droplets, in addition to small amounts of water and oxygen. Researchers predict that weathering on Venus could be caused by a thermal process or corrosion carried out by the atmosphere, volcanic eruptions, impacts of large meteorites, and wind erosion.

As for Mars, it is currently dominated by physical weathering caused by meteorite impacts and thermal variations rather than chemical processes. According to Certini, there

is no active volcanism that affects the Martian surface; however, the temperature difference between the two hemispheres causes strong winds. Certini also said that the reddish hue of the planet’s landscape, which is a result of rusting iron minerals, is indicative of chemical weathering in the past.

On the Moon, on the other hand, a layer of solid rock is covered by a layer of loose debris. The weathering processes seen on the Moon include changes created by meteorite impacts, deposition, and chemical interactions caused by solar wind, which interacts with the surface directly.

Nevertheless, some scientists feel that weathering alone is not enough and that the presence of life is an intrinsic part of any soil. “Studying soils on our celestial neighbors means to individuate the sequence of environmental conditions that imposed the present characteristics to soils; thus, helping reconstruct the general history of those bodies,” Certini said.

In 2008, NASA’s Phoenix Mars Lander performed the first wet chemistry experiment using Martian soil. Scientists who analyzed the data said that the Red Planet appears to have environments more appropriate for sustaining life than was expected; environments that could one day allow human visitors to grow crops.

“There is more evidence for water because salts are there,” said Phoenix co-investigator Sam Kounaves of Tufts University in a press

release issued after the experiment. “We also found a reasonable number of nutrients, or chemicals needed by life as we know it”.

One of the primary uses of soil on another planet would be to use it for agriculture; to grow food and sustain any populations that may one day live on that planet. Some scientists, however, are questioning whether soil is really a necessary condition for space farming.

Researchers found traces of magnesium, sodium, potassium and chloride. The data also revealed that the soil was alkaline, a finding that challenged a popular belief that the Martian surface was acidic.

This information, obtained through soil analyses, becomes important in looking toward the future to determine which planet would be the best candidate for sustaining human colonies.

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Ancient Egyptian Cuisine

By: Sherine Ramadan



The fertile soil of Egypt was an essential factor in helping ancient Egyptians farm a wide range of crops such as vegetables, fruits, and legumes. Meanwhile, agriculture itself played a major role in human settlement, as well as animals and birds domestication. Moreover, Egyptian waters were full of many kinds of edible fish; a cheaper substitute for the relatively expensive meats. All this helped diversify ancient Egyptian food sources, leading to a healthy and integrated diet, which was positively reflected on the Egyptians' health in general.

Ancient Egyptians were gourmets and food lovers, moderate in their eating; they considered gluttony a bad trait; that was mentioned in the Instructions of Kagemni⁽¹⁾: *"If you sit with a company of people, desire not the food, even if you want it; it takes only a brief moment to restrain the heart, and it is disgraceful to be greedy. A handful of water quenches the thirst."*

Vegetables

Many vegetables appeared in scenes and inscriptions on the walls of ancient Egyptian tombs; such as peas, lettuce, leeks, turnips, radishes, and cucumbers; in addition to onion and garlic, which were planted and eaten in huge quantities thanks to their well-known benefits, whether as part of their daily meals or in medical prescriptions.

Fruits

Ancient Egyptians had great appreciation for fruits; such as sycamore, watermelon, cantaloupe, pomegranate, tubers, berries, cyperus, and doum, all of which were eaten fresh or used for sweetening. In later times, some new kinds were cultivated, such as citrus, lemon, walnut, peach, pear, apple, and dates. The fruit was eaten fresh or boiled, or was drunk as juice or wine, or even dried such as grapes (raisins), dates, and figs.

Meat

Egyptians have tended to eat animals' meat since ancient times, preferring beef, followed by mutton and goat; at the end of the list come hunted animals such as deer, wild goats, and caribou while pork was not favored for social reasons.

Birds

There were domesticated, wild, and migratory birds. Geese and ducks were the most favored kind, as well as pigeon, quail, and ostriches. Chicken, however, were not available in Egypt till a later period of history.

Fish

There are many Nile fishing scenes, demonstrating different types of fish: perch, tilapia, mullet, catfish, synodontis, schilbeidae, grouper and gudgeon. Fish was one of the most favored foods for ancient Egyptians; it was eaten in many ways, whether fresh, salted, or dried.

Legumes

Ancient Egyptians liked to eat many kinds of legumes such as black-eyed kidney beans, peas, beans, and lentils for their nourishment and healthy benefits. Moreover, oil was extracted from plant seeds such as sesame, castor, and radishes; Egyptians were also pioneers in using herbs and spices such as star anise, cumin, cinnamon, fennel, fenugreek, mustard, and thyme.

Recipes

Bread occupied a major place on everyone's daily menu. There were about 40 kinds of bread and bakery, differed in shape—round, oval, rolled up, or conical—as well as in the type of flour used—wheat, barley, or corn. Ancient Egyptians also used margarine, honey, milk, eggs, salt, and yeast in making the bread; while

sesame, anise, and cumin were added for decoration. For making sweet pies, they added fruits on the top of the bread such as dates, figs, and buckthorn.

Meat, fish, and birds were either grilled, boiled, sundried, or even salted to be eaten later on; such as mullet fish (*fesikh*), quails, sparrows, and ducks. Egyptians also knew the benefits of adding grease and fats in preserving food while cooking.

As for popular ancient Egyptian dishes that we still eat today, they included: (1) lentils, which were eaten frequently; (2) beans, which were either cooked by being put in the hot oven dust—this was called *"Metehmes"*, later modified to *"Medames"*—or cooked in pots—this was called *"Besarou"*, which we now call *"Bissara"*—both ways are still known and demanded by many Egyptians; (3) salted chickpeas, still known as *"Al-Mlanah"*; and (4) lupine, which was eaten after being soaked in water and salted.

It is clear that the ancient Egyptian cuisine's nutritional elements were well-balanced and integrated. Food was not only a way to obtain energy and health, but also a source of plant and animal remedies for the treatment of diseases as well as curing burns and injuries.

Glossary:

(1) Kagemni: vizier of King Senefru, left a group of instructions and advices addressed to his son about modesty, moderation, and avoiding both pride and gluttony.

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Growing Problems in Growing Food

By: Jailane Salem

Since the beginning of humanity, plucking food from the ground has been essential for survival. In the history of human development, a crucial step was the formation of farming communities. It was a step in creating a more stable way of life because tilling the land was an arduous job; working as a group made it an easier job.

However, despite the importance of farming, in recent decades there have been more and more problems surrounding it. Whilst it is possible for us to generate enough food for the entire world's population, millions and millions of people still suffer from chronic hunger and malnutrition. Many farmers are forced out of their land and a cycle of destructive farming practices are irrevocably ruining what was once fertile land.

Those who see this catastrophe in the making are raising the alarm and clamoring for the world to listen and take action to stop this negative change before it is too late. So what is actually happening? Who is causing this problem? Who are the land vigilantes asking for change? Let us take a look together.

The Trouble Makers

The problems are numerous and intricately connected; one of them is caused by corporations forcing laws and legislations that profit their enterprise while harming the smaller independent farmers as well as the environment. These laws and regulations were implemented using legal methods,

making them part of the framework of the World Trade Organization (WTO), which oversees international trade laws that set the way by which countries trade with one another.

What is unfortunate about the WTO practices is that the regulations it upholds champions global corporations while not always considering the needs of local farmers. By allowing corporates to rule the trade scene and monopolize the market for agricultural products it has had a drastically negative effect on agricultural culture worldwide, especially targeting those living in the developing world.

The global food system currently in place increases problems such as loss of land, promotes monoculture farming that harms land biodiversity, cripples local farmers' abilities to compete in their home

markets, and can contribute to disasters such as famines in extreme cases. However, it is not all doom and gloom since there has recently been agricultural policies that are being developed to promote food sovereignty.

Many people believe that food security is a human right and not a privilege; therefore, regulations should be put in place to protect those rights rather than the ones of corporations. Many are also voicing their opposition in including agriculture in the WTO since the procurement of food is an essential human right that should not be limited to any specific sector or trade.

How do corporates go about making profit?

Many farmers in the Western world have access to subsidies from their government. The subsidies is a form of



support given by the government to ensure farmers' sense of security and that market prices of their products do not have a negative impact on the farmers' businesses. This means that the subsidized crops can be sold at competitive prices, even if their production cost is higher than their selling prices indicate, and are therefore known as artificially priced.

Some of the produce can be sold in their country of origin, but there is a second option; the international market. Corporates have access to international markets, as well as to subsidized farm products. What corporates sometimes do is a practice called "dumping", which means that they buy said subsidized products, price them extremely low then flood a country's market with the cheaper products. This, of course, causes the local counterpart of the product to be left behind since consumers will most likely favor the cheaper product.

"The Institute for Agriculture and Trade Policy recently documented that US corporate food dumping has risen significantly since the inception of the WTO. Agribusiness dumping of the five main commodities of wheat, soybeans, corn, cotton, and rice averaged between 10-47% below the cost of production. Family farmers have watched their incomes crash as multinational agribusinesses have expanded their markets internationally with artificially low-priced agricultural goods."

The problem with dumping is that it has a negative chain effect on farmers residing in countries where dumping takes place. One such example is in Mexico, where corn is a staple food and where farmers grow their own corn. In 1994, Mexico, Canada, and the USA signed a trade agreement known as The North American Free Trade Agreement (NAFTA); since then the USA has been the biggest exporter of corn to Mexico. By flooding Mexican markets with cheaper corn, the price of Mexican corn fell by 70%, causing huge losses to Mexican farmers and workers who rely on corn for their livelihood.



This scenario is not a one-time only occurrence, but is something that repeats itself over and over worldwide, with the poorer countries getting the short end of the stick. *"According to a study by the International Food Policy Research Institute, a nonprofit research organization, the agricultural policies of wealthy nations—including tariffs, export subsidies and direct farm subsidies of over USD 300 billion every year—cost developing nations about USD 24 billion every year in lost income."*

When large numbers of farmers leave behind their land, some corporates swoop in, creating industrial farms, favoring monocultural agriculture, and focus on growing crops for export. This takes a heavy toll on the health of the soil and environment because many do not follow sustainable farm practices; instead they can use harmful chemicals, which seep into the soil damaging it and end up in nearby water systems that can cause harm to residents in the area. It can also lead countries to rely on food exports because they no longer have enough land to grow the previous variety of crops that they used to be able to grow.

Voices of Change

There are those who see how the systems of trade and business create a disenfranchised class worldwide and have decided to speak up and call for the world to change. One such organization is Global Exchange, which is based in the USA; it is an international human rights organization that works towards creating a world where justice prevails and humans come before money.

On their site, Global Exchange states the crux of the matter: *"In a world where the economics of quantity fuels corporate power and political greed, the elite are reaping profits while working people and the planet are left to pay the price. In response to worldwide degradation caused by this system of elite globalization, Global Exchange envisions an alternative economics of quality centered upon protecting international human rights to ensure that the cost of globalization does not come at the expense of us all."*

What they do to combat this issue is to take up activism and try to work towards empowering workers, small farmers, and communities at risk; they have also campaigned for the Fair Trade Movement, which promotes better trading conditions for producers and farmers in developing countries.

There are also international movements that are comprised of farmers such as *La Via Campesina*, which is an international movement that represents 200



million farmers worldwide and is present in 73 countries spanning all continents. It works on defending the rights of small-scale farmers and peasants whose livelihood is sometimes threatened by transnational companies and corporate agribusiness.

The year 1993 witnessed the birth of this movement in Belgium; in debates concerning food and agriculture, they are recognized as an important entity and are consulted by institutions, such as the Food and Agriculture Organization (FAO) of the United Nations. The movement calls for food sovereignty, which *"prioritizes local food production and consumption. It gives a country the right to protect its local producers from cheap imports and to control production. It ensures that the rights to use and manage lands, territories, water, seeds, livestock and biodiversity are in the hands of those who produce food and not of the corporate sector"*.

By ensuring that food sovereignty becomes the main goal of international institutions, the world will see that food is produced for the people and not for the demand of markets and corporations; by doing so, many problems will be eliminated such as poverty, environmental degradation, and chronic hunger suffered by millions of people in the developing world.

While a lot still needs to be done to ensure that farming communities worldwide are protected and independent of the global trade that has kept it ensnared in its destructive grip, there are many working on the ground to create a brighter future for farmers who till the land tirelessly and provide the very sustenance we need to survive. It is thanks to organizations and farmer groups who champion food sovereignty and are protective of the environment that perhaps not all is lost, and in the future we might see a better world where human rights are elevated above monetary profit.

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Intensive farming

With 40% of the planet's land devoted to human food production, and as the world's demand for food, feeding a rapidly growing human population should be done by adopting a sustainable food production approach with minimized impacts on the environment, animal welfare, and human health.

Intensive farming is an agricultural intensification and mechanization system that aims to maximize yields from available land through various means, such as heavy use of pesticides and chemical fertilizers. This has also been applied to raising livestock such as cows, sheep, and chickens, being held indoors in what have become known as factory farms.

Intensive crop agriculture is characterized by innovations designed to increase yield. Techniques include planting multiple crops per year, reducing the frequency of crop-free years, and improving cultivars. It also involves increased and more detailed analysis of growing conditions, including weather, soil, water, weeds, and pests. This system is supported by ongoing innovation in agricultural machinery and farming methods, genetic technology, techniques for achieving economies of scale, logistics, as well as data collection and analysis technology.

Intensive farms are widespread in developed nations and increasingly prevalent worldwide; most of the meat, dairy, eggs, fruits, and vegetables available in supermarkets are produced by such farms. Smaller intensive farms usually include higher inputs of labor and more often use sustainable intensive methods; these farms are less widespread in both developed countries and worldwide, but are growing more rapidly. Most of the food available in specialty markets, such

By: Moataz AbdelMegid

as farmers markets, is produced by these smallholder farms.

Several techniques are included in intensive farming; crop rotation, for example, is one very common technique employed where a series of dissimilar types of crops are grown in the same space in sequential seasons. Benefits include avoiding pathogen and pest buildup, which occurs when one species is continuously cropped; crop rotation also seeks to balance the nutrient demands of various crops to avoid soil nutrient depletion.

A traditional component of crop rotation is the replenishment of nitrogen through the use of legumes and green manure in sequence with cereals and other crops. It can also improve soil structure and fertility by alternating deep-rooted and shallow-rooted plants.

Another example is irrigation using "flood irrigation", the most common and frequently used type, which usually leaves the irrigated area unevenly distributed, as parts of the field may receive excess water in order to deliver sufficient quantities to other parts. Overhead irrigation, in contrast, using center-pivot or lateral-moving sprinklers, would give a much more equal and controlled distribution pattern; it is, however, more costly. Drip irrigation is the most expensive and least-used type, but delivers water to plant roots with minimal losses.

Intensive farming practices produce more and cheaper food per acre and animal, which has helped feed a booming

human population; yet, it has grown to become the biggest threat to the global environment through its impacts on ecosystem and global warming aspects. It has led to the emergence of new parasites and re-emergence of parasites previously considered to be threat neutral, and is responsible for 80% of tropical deforestation.

Furthermore, intensive farming kills beneficial insects and plants, degrades and depletes the very soil it depends on, and creates polluted runoff and clogged water systems. It also increases susceptibility to flooding, causes the genetic erosion of crops and livestock species around the world, and decreases biodiversity within the perimeter of activity.

It is clear that intensive farming is a profiting business that is also essential for the economy considering the fast escalating food demand; however, this sort of "industrial agriculture" will always come with the previously mentioned negative impacts on the agricultural medium and the environment. Nevertheless, certain aspects of intensive farming have helped ease climate change by helping boost yields in already cleared land that may be underperforming, which prevents the clearing of additional land.

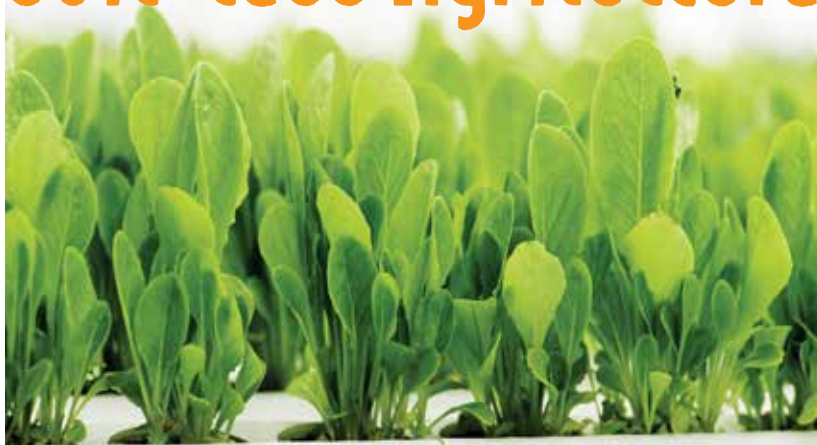
There are both pros and cons to intensive farming. Many would believe that compared to the dramatic disadvantages, the advantages are significantly less. This fact will always be subject of doubt in a world that is in transition from an era of food abundance to one of scarcity.

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HYDROPONICS: Soil-less Agriculture



By: Sara Khattab

As the population of our planet increases and arable land available for crop production declines, agriculture is moving towards more capital-intensive solutions. What plants need is sunlight, in addition to water and nutrients, both are easily obtained from soil. Farmers use hydroponics to grow plants that need hard-to-maintain soil conditions. This technique depends on growing plants in nutrient solutions with or without the use of an artificial medium to provide mechanical support.

The word "hydroponics" literally means growing plants in water, but now it is applied to growing plants in any other medium besides soil. Hydroponics is believed to be in use for thousands of years; the Hanging Gardens of Babylon are largely believed to have functioned according to hydroponic principles. The Aztecs also developed a system of floating gardens based on hydroponics.

With hydroponics the plants are grown in an inert growing medium, which is an inert substance that does not supply any nutrient to the plant. A perfectly balanced pH adjusted nutrient solution is delivered to the roots in a highly soluble form. It is easy

to control the strength and the pH of the nutrient solution, so that the plants receive the right amount of food. This allows the plant to uptake its food with very little effort as opposed to soil where the roots must search out the nutrients and extract them.

There are many different types of hydroponic systems, though each is based on the same basic concepts.

Ebb and Flow System: Also known as flood and drain system, it includes a tray in which the plant is placed in a medium; below the tray in a separate container is a reservoir containing water and mineral solutions. A timer is set to periodically activate a pump that is kept in the nutrient reservoir. When activated, the pump floods the tray with the nutrient solution, feeding the plants the nutrients they require for optimal growth. This system works best with small plants such as herbs and are typically used at home.

Drip System: Vital nutrients are added to a tank of water to create a nutrient reservoir that is kept away from plants. The water is then pumped up a network of tubes, and is released to the plants individually; the pump can be controlled

using a timer. This system is ideal for plants that do not have a developed root system such as smaller plants, just like the Ebb and Flow Systems.

Nutrient Film Technique (NFT): A water-based system that requires no soil or mediums, it is built using wooden channels; water enriched with nutrients is pumped to the high end of each channel. The channels slope down, and water is collected at the end to be pumped back through the system and reused. Only plants with large established root systems will work with this system, such as tomatoes and cucumbers.

Aeroponics: In this system, the plants are suspended in the air, with their roots hanging down below. The nutrient solution is then pumped up a tube, where a second higher pressure pump sprays the solution as a mist over the hanging roots. This system is the most difficult to set up and manage, but it has great potential for large commercial uses.

Wick Systems: Medium-based, plants are placed into a tray filled with perlite or rockwool; at the base of each root, a nylon rope is placed and is allowed to dangle freely, extending to the bottom of the tray. The tray is placed on top of a reservoir; the nylon ropes absorb the water and nutrients, wicking them up to the plant's roots. This system is preferable as it requires no pumps or other equipment to be purchased.

There are significant environmental benefits to the use of hydroponics systems; they only require around 10% of the water that soil-based agriculture requires. This is due to the fact that hydroponic systems allow recycling and reuse of water and nutrient solution, so in this case no water is wasted. As many pests are carried in soil, hydroponics eliminates the massive use of pesticide, effectively making air, soil, and food cleaner, also preventing diseases carried by them. Moreover, it requires only around 25% of fertilizers.

Since plants grown hydroponically have direct access to water and nutrients, they are not forced to develop extensive root systems to allow them to find nutrients they need. This saves time and produces healthier plants in about half the time as traditional. Hydroponics is ideal for indoor growing, so it can be used to grow plants all year round.

Hydroponics technique is the fastest growing sector of agriculture, and can be a solution to the world's growing concerns such as diminishing soil, water scarcity, and food scarcity.

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FARMING ADVANCES

By: Jailane Salem



Farming has come a long way from the days when it only took a plough, a sickle, and water to grow food to today's farming where machinery, new techniques, and science are used. The amounts of food we are capable of producing has far surpassed what could be produced in the past. However, even with these advances close to a billion people still suffer from food insecurity and chronic hunger.

In the developing world, where most people suffering from hunger reside, a "Green Revolution" took place in the 1960s and 1970s, witnessing the use of technological advances to help increase the crop yield. Crop varieties that were specifically designed to be high yielding were used, improved irrigation methods were applied, and farming management techniques were introduced, helping transform the livelihood of farmers. These innovations in agriculture are key to increasing the world's food supply; advances in farming have not stopped since the Green Revolution, so let us take a look at some of the newer techniques and devices being used nowadays.

Soil is, of course, one of the key players in farming; there are varying kinds of soil, some more fertile than others. The overuse of fertilizers can do more harm than good; if they are used in excess and not all of it is absorbed by the plants then they will end up polluting waterways. To combat this issue, a new method is being used in the application of fertilizer; this is called Fertilizer Deep Placement.

What this means is that, instead of just spreading the fertilizer across the whole of the land, the farmers use a specialized fertilizer called "briquette", which releases nitrogen in a gradual way, ensuring that the plant gets the nitrogen it needs over a period of time. The briquette is placed near the growing plants, around 10 cm deep; this method ensures that only the amount needed is used, making the use of nitrogen much more efficient. This method is being used in some African countries such as Nigeria, and has generated great results.

This use of site specific nutrient management can also apply to the irrigation of crops. Irrigation systems that make use of plastic pipes that have little outlets for water called drippers are placed where the root of the plant is, and water is slowly released in that area specifically. This use of small amounts of water helps in conserving water, allowing the soil to retain its nutrients since the nutrients will not be run off by excess water.

A great addition to this system is that it can also be made using solar power, so not only would farmers be conserving water, they will be conserving on energy. A study was conducted in Benin, and it was found that this solar drip irrigation system was cost-effective and also helped increase household incomes in the villages where the test took place. This system is still highly costly, and therefore, not widely available to farmers yet; however, researchers are hoping to create a more affordable design in the coming years and have it widely available to farmers.

Precision farming has also led to the development of devices that allow farmers to collect real accurate data from their own fields and make decisions on farming management using this data. One such device is called the "GreenSeeker"; it is used to measure the nitrogen level of plants as well as assess a plant's health.

According to Bruno Gérard, the Director of the Global Conservation Agriculture Program at the International Maize and Wheat Improvement Center, "The GreenSeeker is based on the relationship

between the light reflectance in the red and near infrared spectrum of a plant, and the nitrogen status of that plant". This handheld device is quite handy in aiding farmers to make more informed decisions, and can also help reduce the pollution of groundwater.

Of course, no talk of technology is complete without the mention of robots, and in recent years farming robots have been making great advances. These agricultural robots, or AgBots, can collect various data, record the amount of rainfall, soil water content, as well as monitor irrigation. They can also capture images and videos, and send them to farmers in real time, as well as send sms alerts if something wrong was detected. Some AgBots are being designed to be able to mechanically or chemically remove weeds and pests.

AgBots are made using microcomputers, sensors, mobile network modems, and some are even connected to small drones that can fly over fields and collect aerial data. With energy always a key issue, they are being designed to be solar powered, making them energy efficient. Linked with analytical and statistical software, a staggering amount of data will be readily available to farmers that will take agricultural management to a whole new level.

With these advances and many more to come, hopefully efficient farming techniques and technologies will provide a large part of the solution to feeding the world's hungry mouths.

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DATA FARMING

The world's population is growing rapidly, which means that we are facing an increasing demand for more food. With the idea of genetically modified food still not appealing to public appetites, increasing crops production efficiency is key. Big data-enabled services are thus being launched to assist farmers with live monitoring of data collected and comparing it with other sources.

When a farmer is offered a new brand of seed to be tested, he will most probably test it in the Spring; however, he will not see results until the Fall. Moreover, he will definitely test it again for a few more seasons to ensure that he is monitoring a pattern. After three years have passed, the farmer will have solid feedback; yet, he will still be left wondering whether it really was the seeds that made a difference. It could have been the new fertilizer he used, or maybe the crop spacing, or the land quality, or any of the other variables that can impact a harvest.

The Farmers Business Network is a new startup working on aggregating data from farmers across the United States of America to help them learn from each other, using the concept of crowd sourced agriculture. They recently used specialized sensors and succeeded in collecting the data of nearly seven million acres of farmland across seventeen States.

At the beginning of using sensors, farmers used to walk into the fields to read each one individually which is an exhausting process that they sometimes did just once a week. With the aid of solar powered stations distributed through the entire field we can depend on green energy to collect all required readings from the sensors adding on them data related to weather around the field so as to help decision makers to decide when to irrigate and the quality of the used seeds. One of the stations transmits that information to a main database via cell signal and the farmer can collect, access, analyze, and share data



By: Ahmed Khaled

on his computer, tablet, or phone from his office, truck or home.

All the collected data can be compared by laying the maps side by side and evaluate the impact of each aspect on the field, as well all these data can be shared with experts or trusted partners that can be selected based on the user's preferred criteria to ask for their advice. Using this type of technology farmers can save money spent on water and save water for other purposes as well managing the health of the orchard better to produce better quality crops.

Myjohndeere.com is an online portal where any farmer can register his details and later access all gathered data from sensors attached to their own database, connecting this data with external datasets, including weather and financial data. One of the examples that can be collected is the fuel consumption from different machines, which can be monitored to analyze the productivity levels according to the usage. This data from different environments and different crops will make a huge database that can fine-tune the operation to have the optimum level of high quality production.

This portal is a very helpful tool that minimizes downtime of machines by live monitoring and pre-tests, then can predict failure points before they fail, so this information can be shared at an earlier stage to the engineers who will plan for spare parts ordering and schedule more maintenance services to the used machines.

With the use of this portal there are so many benefits rather than just collecting data and comparing the results; any farmer can ask for agricultural tools and products such as spare parts for seeding systems, compressors even loaders and tractors. If the farmer is a beginner he can start by asking for planning, such as risk assessment plans or revenue plans, which can assist him at the beginning of his farming journey.

Still, many farmers will hesitate and will not be eager to use that much technology as they worked by hand; however, it will take time like any other technology to pay off and start spreading in the world.

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By: Moataz AbdelMegid



Water-wise farming, also known as Xeriscaping, is farming, landscaping, and gardening that reduce, minimize, or eliminate the need for supplemental water from irrigation. It is promoted in regions that do not have easily accessible, plentiful, or reliable supplies of fresh water, and is gaining acceptance in other areas as access to water becomes more limited.

The term Xeriscaping is a derivation from a combination of the words “xeri” from the Greek word “xeros” meaning dry, and “scape” meaning scene. Even though this translates into “dry scene”, it does not accurately reflect the results or the impact of Xeriscaping because it does not include barren, desert, arid, or any other form of plant material that you might associate with dry climates. Perhaps the most accurate way to define it is the creative use of landscaping to conserve water usage.

There are many aspects to Xeriscaping; yet, at its essence, it involves the use of plant materials that are appropriate for the region or to the water availability. This frequently means the use of native plants. Xeriscaping uses various specific species of plants, the choice of which to use is always case sensitive; meaning that, for every specific case, there is an optimal species to use. The selection is usually based on the climatic conditions and the type of soil used.

A new view of water-wise gardens has evolved from the creativity and experimentation of gardeners; it is supported by the wider availability of native and adapted plants from high altitude dry climates around the world. Growing on less water does not mean water-wise gardens will look like a garden of cactus; they can be colorful, include a wide variety of plants,

and delight as much as the traditional generously-irrigated garden.

Creating a Xeriscape landscape is not a matter of opening a cookbook and following instructions. There are many unique elements that are specific to the location of the site, the site characteristics, the owner’s preferences, and a number of other factors. There are seven basic design principles for Xeriscaping that have been expanded into simple and applicable concepts to creating landscapes that use less water. The principles are appropriate for multiple regions and can serve as a guide to creating a water conserving landscape that is regionally appropriate; they are also easy to implement for homeowners.

1) Plan and design

Create a diagram of the location, drawn to scale, and show the major elements of the landscape, including house, driveway, sidewalk, deck or patio, existing trees and other elements. Once a base plan has been determined, a conceptual plan showing the areas for turf, perennial beds, views, screens, slopes, can be done.

2) Soil amendment

Most plants will benefit from the use of compost, which will help the soil retain water. Some desert plants prefer gravel soils rather than well-amended soils; plants

should either fit the soil, or soil should be amended to fit the plants.

3) Efficient irrigation

Xeriscape can be irrigated efficiently by hand or with an automatic sprinkler system. For grass, use gear-driven rotors or rotary spray nozzles that have larger droplets and low angles to avoid wind drift. Spray, drip line, or bubbler emitters are most efficient for watering trees, shrubs, flowers and groundcovers.

If watering by hand, avoid oscillating sprinklers and other sprinklers that throw water high in the air or release a fine mist. The most efficient sprinklers release big drops close to the ground; water deeply and infrequently to develop deep roots. Never water during the day to reduce water lost to evaporation. With the use of automatic sprinkling systems, adjust the controller monthly to accommodate weather conditions; also, install a rain sensor to shut off the device when it rains.

4) Appropriate plant and zone selection

Different areas in a yard receive different amounts of light, wind, and moisture. To minimize water waste, group together plants with similar light and water requirements, and place them in an area that matches these requirements.

Put moderate-water-use plants in low-lying drainage areas, near downspouts, or in the shade of other plants. Turf typically requires the most water and shrub/perennial beds will require approximately half the amount of water. Dry, sunny areas support low-water-use plants that grow well in our climate. Planting a variety of plants with different heights, color, and texture creates interest and beauty.

5) Mulch

Mulch keeps plant roots cool, prevents soil from crusting, minimizes evaporation, and reduces weed growth. Organic mulches, such as bark chips, pole peelings, or wood grindings should be applied 5–10 cm deep. Fiber mulches create a web that is more resistant to wind and rain washout. Inorganic mulches, such as rocks and gravel, should be applied 5–7.5 cm deep. Surrounding plants with rock makes the area hotter; limit this practice.

6) Limited turf areas

Native grasses that have been cultivated for turf lawns, such as buffalo grass and blue grass, can survive with a quarter of the water that bluegrass varieties need. Native grasses (cool season) such as bluegrass and tall fescue, are greenest in Spring and Fall, and go dormant in the high heat of the Summer.

New cultivars of bluegrass, such as Reveille, and tall fescue, can reduce typical bluegrass water requirements by at least 30%. Fine fescues can provide substantial water savings and is best used in areas that receive low traffic or are in shady locations.

Using the appropriate grass will limit the amount of grass to reduce the watering and maintenance requirements.

7) Maintenance

All landscapes require some degree of care during the year. Turf requires Spring and Fall aeration along with regular fertilization every six weeks to eight weeks. Keep the grass height at 7.5 cm and allow the clippings to fall. Trees, shrubs and perennials will need occasional pruning to remove dead stems, promote blooming or control height and spread. Much of the removed plant material can be shredded and used in composting piles.

Among the many benefits of Xeriscaping is the lowered consumption of water; Xeriscaped landscapes use up to two-thirds less water than regular lawn landscapes. It makes more water available for other domestic and community uses and the environment. Also reduced maintenance is one of the advantages; aside from occasional weeding and mulching, Xeriscaping requires far less time and effort to maintain. The cost to maintain is also less, as Xeriscaping requires less fertilizers and equipment, particularly due to the reduced lawn areas.

Xeriscape plants in an appropriate planting design, soil grading, and mulching, takes full advantage of rainfall retention. Lawn clippings can contribute to organic waste in landfills and the use of heavy fertilizers contributes to urban runoff pollution; therefore, Xeriscaping offers reduced waste and pollution.

On the other hand, Xeriscaping may not meet modern aesthetics, especially

in Europe, where some homeowners associations have strict rules requiring a certain percentage of land be used as lawns. Reducing lawn areas can limit a garden's use as a recreational area, and above all, the initial cost, as with any landscaping project, may be a deterrent for some of the stakeholders.

In Egypt, there are several Xeriscaping contractors competing in the market and the water-wise farming business is slowly growing. The need for such a business is directly proportional to the demand and supply situation of irrigation water. Although most of Egypt's land is unfertile desert, agriculture has always been the main economic activity thanks to the continuous flow of the Nile River.

Today, in light of political changes in the region, raising questions about water security of supply, in addition to rapidly growing population density and wide range of water-consuming activities, it is unavoidable that at certain times and places in Egypt water resources will become critically scarce. This fact should directly reflect on the behavior of the numerous water-dependent habitants. Therefore, responsible techniques in agriculture and water consuming activities that economize the demand of water, like water-wise farming, should be widespread applied and utilized.

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FOOD SCIENCE AND FOOD CONSERVATION

By: Nourane Khaled

Food preservation is a process that involves preventing the growth of microorganisms—bacteria, fungi, yeasts, etc.—retarding oxidation and enzymatic reactions in order to extend the shelf-life of food, as well as maintaining its quality for a longer time.

Food preservation is one of the main food technologies that have been in use for ages. In the past, people used basic and simple methods to keep their food from spoiling and storing it for long periods; they used to sundry fruits and vegetables, salt meat and fish, and ferment milk. The techniques were primitive and the additives were natural, but these simple methods saved countless lives during famines, wars, and natural disasters.

Time has changed; science, mechanization, and technology have broken through the food preservation domain. Pasteurization was discovered, machines did more parts of the process, dryers have become electrical, chemical food additives are widely used; now, the process has become fully mechanized with minimal interference from humans.

Famous Food Preservation Techniques

Drying: One of the oldest and most used methods, it involves the removal of water from the food product. Long ago, people used to dry their food by sunlight, air, or wind. Recently, new technologies and machines are used beside the old techniques, such as electric food dehydrators or spray and drum dryers, which are used for making powder milk and juice.

Smoking: One of the oldest preservation methods, it is the exposure of food to smoke from burning wood. The chemical components of the smoke act as preservatives and the heat dries the food product. A

famous example for this method is smoked fish, which is salted then smoked to ensure its safety.

Pickling: A famous method for preservation, it consists of conserving the food in a salty solution (brine), vinegar, or oil. Examples include pickled vegetables such as cucumber, olives, carrots, etc.

Curing with salt (salting): It consists of adding high amounts of salt to the food so that water is drawn out by osmosis. Famous examples include salted fish like sardines and *Fesikh*; however, consuming *Fesikh* may cause dangerous health issues if inappropriately conserved.

Sugaring: The same technique of salting but we use sugar instead of salt. The food is stored in sugary solution or cooked with sugar like what we do in jams.

Canning: Discovered by French confectioner Nicolas Appert, food is cooked and sealed in sterile cans or jars that are then boiled to kill or weaken any remaining bacteria. If this is properly done, food remains safe as long as the can or jar is sealed. People used to cook the food and boil glass jars at home; nowadays, fully mechanized factories prepare canned food.

Pasteurization: Discovered in 1862 by French scientist Louis Pasteur, this method is used with liquid food only. It consists of heating the food to 72–75°C for 15–30 seconds, then immediately cooling it to 4°C. Pasteurized food must be stored in a refrigerator; a famous example is pasteurized milk.

Ultra High Temperature (UHT) sterilization: A stronger form of pasteurization, liquids are heated to 135–140°C for few seconds, then cooled and packed in sterile container. This method kills all microorganisms in the food. UHT treated food can be kept in

Food science is the discipline concerned with the biological, chemical, and physical aspects of food, from harvesting or slaughtering to consumption; that is, “from the farm to the fork”. Food technology, on the other hand, is the application of food science to select, preserve, process, pack, distribute, and use wholesome and safe food.

room temperature for months; famous examples are milk and juice packs we find in stores.

Refrigeration: A recent technology that originated after the discovery of electricity and the invention of refrigerators, food is kept in a low temperature (4°C or lower) to slow down the growth of microorganisms and the enzymatic actions. A common example is any type of food stored in refrigerators in houses, factories, and restaurants.

Freezing: A technique close to refrigeration, freezing food at -18°C or lower stops microbial growth and enzymatic actions, thus, extending the conservation several months. This method is widely used nowadays for fresh and cooked food; examples for this method include commercial frozen vegetables and any type of frozen food stored in domestic or large freezers.

Artificial food additives: Antimicrobial or antioxidant chemical substances that prevent spoilage and deterioration of the food, they are safe if used according to the recommended amounts. Examples include the use of nitrates and nitrites in processed meat.

Irradiation: Sometimes called “cold pasteurization”, this is a recent technology where food is exposed to ionizing radiation that kills microorganisms, insects, and pests.

At the end, we should all know that food conservation always has been and will remain a lifesaving technology. Following strict hygienic practices during preparation is compulsory to ensure a safe nutritious food.

Although a lot of progress has been done in this domain, discoveries never end and there is more to come!

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FEEDING

BODIES, MINDS

By: Esraa Ali

Feeding minds entails processes related to acquiring knowledge and improving mental abilities; however, without feeding our bodies, our minds will never be nourished. That is why our school-age children must be taught how to make good food choices and develop healthy eating habits to have the energy to study and learn, and be physically active. Likewise, they will also be protected from debilitating health problems and have better chances of leading healthy lives.

Children need to eat healthy and have balanced diets; they need three meals a day, a breakfast before going to school being particularly important to help them learn well. As their bodies grow and develop very fast, they need increasing amounts of food that provide them with energy, such as cereals; help in their growth, such as animal foods, legumes, and oilseeds; and protect them against illness, such as vegetables and fruits. Thus, make sure to include a variety of foods with the right proportions in your child's diet.

Moreover, healthy snacks between meals provide the child with energy, and helps him/her grow well. However, eating many sticky, sugary and salty snacks, such as sweets, chocolates, candies, and sodas are not good for a child. They do

not help the body grow well, nor protect against illness. They can also cause tooth decay, lead to overweight and obesity, and overweight-related diseases.

Families should teach their children how to recognize and choose healthy foods. They should also know what foods their children eat and buy at school, and guide them in their choices. Although families' roles are essential in shaping children's eating behaviors, they cannot achieve this goal on their own when the culture has greater influence on food-related beliefs, values, and practices.

Schools must support teaching children basic skills of food and nutrition; they are an ideal setting for this. They can help children practice healthy eating and resist social pressures, which discourage healthy eating. As a matter of fact, schools are regarded in many communities as the only place for children to acquire these important life skills.

Through implementing various activities at schools, children, adolescents, as well as their families' nutritional well-being and healthy life-long eating habits will be developed. Many health problems due to vitamin and mineral deficiencies, such as preventable childhood blindness—due to vitamin A deficiency—and intellectual disability and brain damage in children—due to iodine deficiency—could be prevented or significantly reduced using effective school programs.

These programs shall integrate food and nutrition education in the school curriculum, as well as engage children in practical activities. The programs might include, for example, growing fruits and vegetables in school gardens, preparing food, and improving school meals.

Governments recognize the importance of school feeding in the development and growth of children, communities, and society as a whole. School meals, for example, help children grow, concentrate better, and succeed. They support development so children can become healthy and productive adults, breaking the cycle of hunger and poverty.

In poor countries, school meals provide an incentive to families to send and keep their children at schools. These meals are often the only regular meal a child receives. The World Food Programme (WFP), one of the largest humanitarian providers of



school meals worldwide, states that nearly all countries around the world have a school feeding program, and at least 368 million children from kindergarten to secondary school receive food at school everyday. Unfortunately, many more children do not benefit from this program in countries with high poverty rates.

"Tell me, and I will forget. Show me, and I may remember. Involve me, and I will understand." – Chinese proverb.

In many countries, whether food supplies are scarce or abundant, diet-related chronic diseases exist. It is crucial to know how to make the best use of our resources to ensure nutritional wellbeing. Families and schools do not bear the responsibility of improving the diet of children on their own. All the society sectors must cooperate to promote better nutrition and good diets, develop life skills, and increase environmental awareness among our children.

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OCCUPATIONAL SAFETY AND HEALTH IN AGRICULTURE

By: Hend Fathy



Most of us spend nearly one-third of our days at our workplaces, and experience different safety and health issues according to the type of job we do and the work environment we work within. Miners, for example, are exposed to hazards different from factory workers, chemists, office-based staff, farmers, etc.

Although the International Labour Organization (ILO) Constitution states that workers should be protected from sickness and injury arising from their employment, the reality is very different. Around two million people die annually from work-related accidents and diseases, and there are nearly 160 million people suffering from work-related diseases. In response, the ILO has adopted a global strategy to improve Occupational Safety and Health (OSH) during the past decade, setting tens of OSH standards, instruments, and codes of practices.

I have been lucky to be assigned the task of translating the ILO "Draft Code of Practice on Safety and Health in Agriculture" into Arabic at some point of my career. I, thus, got acquainted with the various kinds of hazards/risks workers at the agriculture sector face, and the measures of protection that should be followed to guarantee they return home safe and sound. Let me share some of this information with you, starting with the Personal Protective Equipment (PPE), which will be present in all the scenes.

Personal Protective Equipment



Personal Protective Equipment (PPE) are the most basic line of defense against hazardous conditions in agricultural production. However, it should never be considered an adequate substitute for other control measures.

Popular PPE includes helmets for workers exposed to the risk of head injury, face shields, eye protectors, and respirators used to protect against flying particles, fumes, dust, and chemical hazards. They also include gloves to protect hands, safety footwear with slip-resistance properties, knee protectors when tasks involve kneeling. Hearing protection devices such as muffs or earplugs are designed to attenuate noise

and allow safety signals to be heard. Last but not least, adequate washing and hygiene facilities should be available at the worksites.

Farmers should be fully informed of the significance of using PPE, and given adequate training on how to use and maintain them. Each set of equipment should be personal to one wearer, unless properly cleaned and sanitized after each use. Generally, equipment should be handled according to the nature of hazard and the instructions given by the manufacturer.

Exposure to Dusts and Particulate Matter



Agriculture involves the generation of a variety of dusts and other particulate matter

that are potentially hazardous to the health of farmers.

Some dusts are generated during the production processes of various grains, legumes, and other field crops; this involves preparing seeds for planting, harvesting, primary processing, bagging, and transporting crops to markets. Such dusts may include components such as straw, bagasse, husks of grain, fungal and bacterial residues, pesticide residues, and particles of silica.

Other forms of dusts are related to animal production, and may include particles of straw and grain, animal wastes, bacteria, toxins, fungi, animal hair, feathers and pollen. Exposure can cause various lung diseases, such as chronic obstructive pulmonary disease, asthma, Organic Dust Toxic Syndrome, and extrinsic allergic alveolitis also known as Farmer's Lung.

Total elimination of exposure to such harmful dusts is practically impossible, particularly in outdoor environments; hence, the use of PPE is particularly vital in this concern. Farm owners should employ bio-filtration and ventilation technologies in closed facilities to minimize the hazards. Construction of animal confinement houses should ensure adequate space per animal and reasonable ceiling heights to minimize the concentration of dusts. Last but not least, regular adequate cleaning of the workplace equipment aimed at reducing exposures should be performed.

Handling Animals

Animal and bird production operations involve different hazards, including exposures to animal wastes, with risks of



exposures to ammonia, methane, bacteria, and zoonoses*.

Ammonia is emitted in high levels from livestock and poultry wastes; exposure to it during indoor operations results in watering of the eyes and breathing irritation. Methane is produced in manure systems and it can result in death from asphyxiation. Bacterial infection, on the other hand, may happen due to secondary contamination of groundwater with *E. coli* and other coliforms. It can result in severe gastrointestinal diseases, such as diarrhea and severe kidney infection and other problems.

As for zoonotic diseases, workers can develop symptoms of them after handling an infected animal or animal by-products. Humans are the ultimate hosts to zoonoses, such as anthrax, which causes skin lesions; brucellosis, which causes fevers; psittacosis, which causes pneumonia; and avian influenza.

To control animal-related hazards, some protective measures should be taken. Animal confinement facilities should be adequately ventilated to protect the workers from high levels of unsafe gases. Similarly, farmers should not step into them without the use of appropriate PPE, including gloves, masks, eye protectors, as well as appropriate gowns, aprons, and boots.

Farm owners should consider regular vaccination of animals and workers to reduce the risk of zoonoses. Specialized trainings should be held for workers who perform procedures involving the skin of an animal being broken and in contact with animal's body fluids. These trainings are meant to keep them safe from infections.

It is also important to maintain sustainable safe water supplies in the farm, safe practices of waste disposal, regular cleaning and disinfection of contaminated sites, and prompt treatment or proper disposal of infected animals.

Chemical Hazards



Agrochemicals are widely used in agriculture worldwide, posing serious health risks to farmers and the general public. Although most fertilizers are non-toxic, some are hazardous; for example, the gaseous forms of anhydrous ammonia can cause skin irritation and potentially serious respiratory effects.

Other sources of chemical hazards are exhaust gases from fuel-powered equipment and toxic gases formed during crop storage. Pesticides and similar products such as fungicides, herbicides, insecticides, and rodenticides are the most commonly used agrochemicals, and are of greatest concern in regard to health and safety in agriculture.

Hazardous chemicals find their way into the human body through what is known as routes of exposure. The main route of exposure is absorption through the skin, which can occur during spraying the chemical. Intensity of skin exposure depends on the frequency of activity, the concentration of the chemical, or the pesticide active ingredient, and whether application and protective equipment are used correctly. Women and children—who are heavily employed in agriculture in the developing world—are particularly vulnerable to absorption through the skin.

Another major route of exposure is inhalation, where gases and vapors are absorbed in the respiratory tract. Inhalation is common when working with volatile compounds or in enclosed spaces such as greenhouses.

exposure to some agrochemicals such as organophosphorus and carbamate insecticides can result in local or systemic acute health effects, causing symptoms of poisoning to occur within very short periods. The symptoms can range from headaches, excess salivation, and nausea, to respiratory distress and death.

Other agrochemicals can cause chronic health effects; lung cancers and leukemia have been associated with occupational exposures to pesticides. However, chemicals with clear evidence of carcinogenicity are banned and no longer registered in most countries. Other chronic diseases include neurotoxicity, liver and thyroid diseases, and allergic dermatitis.

To protect farmers from such chemical hazards, governments must abide by and enforce international standards and legislations concerning the use of hazardous chemicals in agriculture. By doing this, most other risks can be avoided through following Safe Work Procedures (SWPs), and consulting the pesticides labels and other health and safety materials. These materials provide critical information and advice on the safe handling of the chemicals, proper mixing, loading, and application procedures. They also carry information on potential health effects and mitigation measures.

Other administrative issues can further control chemical hazards. Examples include reducing the period of exposure of

workers, regular cleaning of contaminated equipment, immediate clean-up of any accidental spills or leaks, applying safe storage and disposal practices, and using appropriate PPE.

Use of Machinery



Among the most commonly used agricultural machinery are tractors. Hazards associated with tractors are instability resulting in rollovers, crushing injuries from unintended rolling, slips and falls when climbing on or off tractors, as well as organic injuries caused by noise and vibration.

To minimize these hazards, owners and operators of tractors must follow SWPs; they must be physically fit to drive and control the tractor. They should be familiar with the operating instructions and aware of the associated risks and the means to prevent them.

The tractors should be equipped with ladders or steps and handrails to enable operators to mount and dismount them safely; furthermore, operators must always fasten the seat belt and abide by the "one seat-one rider" rule.

Last but not least, there must be a strict maintenance system to the machine itself. The owner has to ensure that the brakes, lights, and other safety devices are regularly maintained and kept in safe working condition to minimize potential risks.

There are several other hazards and risks that threaten workers in agriculture such as thermal exposure, noise, vibration, potential fires, and more. Most of the required measures may read luxuries and unrealistic to you, especially in developing countries such as Egypt where most agricultural activities go unsystematically. However, all these hazards must be seriously addressed to protect around billion workers worldwide. Otherwise, more than one-third of the world's labor force involved in agriculture, as well as the world's food supply, will remain in danger.

Glossary

*A zoonosis is any disease or infection that is naturally transmissible from vertebrate animals to humans.

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GIVE ME A BOOK NOT A PICK

By: Esraa Ali

"Give Me a Book, Not a Pick" is the title of a drawing by an 11-year old child; she used it to express her view of child labor. The drawing was published along with other artworks by children from all over the world in a book entitled *Children's Views of Child Labour* published by the International Labour Organization (ILO) and the Geneva World Association. The Book includes drawings and poems by children, emphasizing the need for urgent action to rescue defenseless children from child labor.

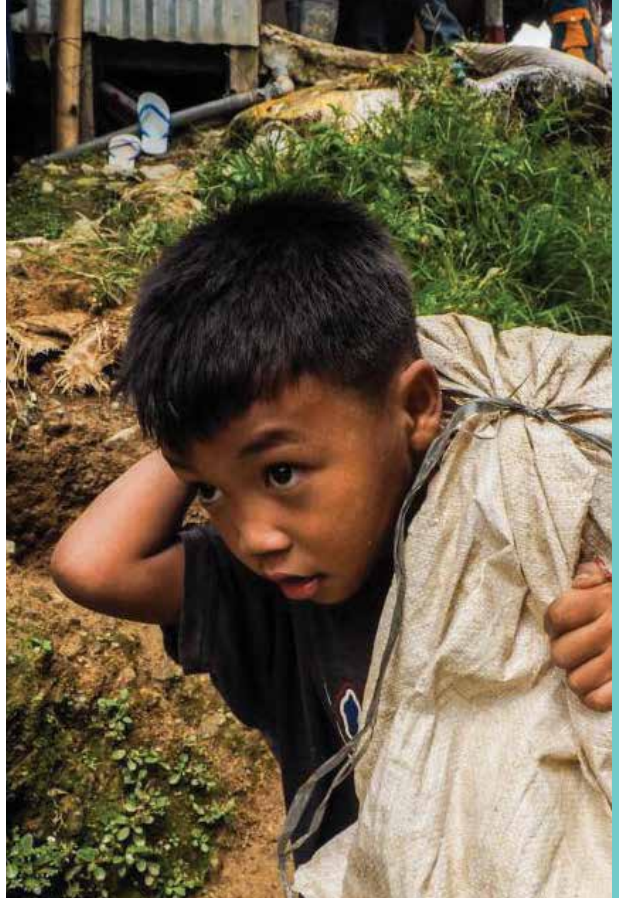
Child labor is defined by the ILO Convention No. 138 on Minimum Age (1973) and the ILO Convention No. 182 on Worst Forms of Child Labour (1999) as work that harms children's well-being and hinders their education, development, and future livelihoods. It is a violation of human rights that damages health and personal development based on child's age, activities performed and hazards involved, hours and conditions of work.

Child labor is mostly found in agriculture, which is one of the most dangerous sectors in terms of work-related fatalities, non-fatal accidents, and occupational diseases that can last into their adulthood. Children are particularly at risk as their bodies and minds are still developing and are more vulnerable to hazards.

Sixty percent of all child laborers, aged 5–17 years old, work in agriculture, including farming, fishing, aquaculture, forestry, and livestock. The majority of child laborers, around 67.5%, are unpaid family members; this percentage is higher in agriculture and is combined with very early entry into work.

Indeed, children's participation in some agricultural activities is not always child labor, and it is important to distinguish between light duties that do not harm the child, and child labor. Non-hazardous age-appropriate tasks that do not interfere with schooling and leisure time can be positive; they contribute to the inter-generational transfer of skills and children's food security. These tasks also result in some attributes often detected in young people engaged in some aspects of farm work, such as improved self-confidence, self-esteem, and work skills.

However, for nearly 100 million girls and boys, their work in agriculture goes beyond these limits and becomes child labor that needs to be eliminated. Eliminating child labor in agriculture is intertwined with other development issues. Poverty is one of the main causes along with limited access to quality education and traditional attitudes towards children's participation in agricultural activities.



Child labor is often a choice between life and death for children whose parents are unable to support their families. It perpetuates a cycle of poverty for the children involved, their families, and communities. When children are forced to work for long hours, they become unable to attend school or vocational training, which prevent them from gaining education that could help lift them out of poverty.

Without education, these boys and girls are likely to remain poor. By perpetuating poverty, it undermines efforts to reach sustainable food security and end hunger. Accordingly, poverty is regarded as cause and consequence in one, and that vicious circle must be broken.

Child labor is an agricultural issue worldwide that undermines sustainable agriculture and food security; it cannot be eliminated simply by prohibiting poverty. Decisive measures must be taken to ensure that children do not have to work to supplement their family income, which includes the protection of vulnerable families, access to social services, and the creation of decent work for those of working age.

In order to address this matter, the Food and Agriculture Organization (FAO) and ILO are increasingly focusing on combating child labor in agriculture through developing many initiatives since 2007. The World Day Against Child Labour (WDACL), observed on 12 June, to raise awareness about children worldwide working in situations of child labor in agriculture, as well as the importance of addressing this human rights violation for achieving food security and reducing poverty.

Child labor is a problem of a large magnitude; it is difficult to eliminate it completely, but not impossible. New generations have the right to attend school, be protected and cared for, and not face any kind of violation or be deprived from their childhood. They have the right to be children. If we have effective mechanisms, strong willpower, and everyone contributes, elimination of child labor is within our reach.

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www.fao.org
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Agritourism

By: Moataz AbdelMegid



Anytime a farming operation opens its doors to the public and invites visitors to come and enjoy their products and services that is agritourism. There are various terms that refer to Agritourism in different parts of the world; the most common term is "farm stays".

Agritourism includes a wide variety of activities, including buying products that are directly produced from a farm stand, navigating a corn maze, picking and collecting fruits, feeding animals, or simply staying over at a B&B on a farm. Farms and ranches invite the public onto their property to experience the out-of-door, the leisure pace, and the healthy and nutritious produce that is only possible when it is fresh picked at the peak of perfection. Some farm owners have become involved in agritourism as a way of supplementing their income, while others desire an opportunity to educate the public and introduce people to farming.

Today, agritourism is considered one of the fastest growing segments of travel industry because it offers a huge variety of entertainment, education, relaxation, outdoor adventures, shopping and dining experiences. Farm stay businesses market their activities by highlighting how people can have a new experience on the farm land while escaping from the stress of traffic jams, office cubicles and carpooling.

A segment of rural tourism is referred to as nature-based tourism, ecotourism, or sometimes recreation-based tourism. Nature-based tourism attracts people interested in visiting natural areas for the purpose of enjoying the scenery, including plant and animal wildlife. Examples of nature-based tourism include hunting, fishing, photography, bird watching and visiting parks.

Equine tourism activities may also be a part of agritourism; this includes using horses for horseback riding lessons, trail-riding

opportunities, boarding facilities and reproduction services and may provide profitable value-added businesses. One other possibility that can be considered is hosting weddings on a farm as a part of agritourism.

As a form of niche tourism, agritourism is counted as a well-established industry in many parts of the world. Pioneers of this industry are Australia, Canada, China, the Philippines, and the USA.

In China, an imperial study in a rural village in the district of Yunnan examined the impacts of agritourism on an ethnic community and discussed the challenges faced by residents who are attempting to improve their livelihoods through tourism. This qualitative study of selected households indicated positive experiences both economically and socioculturally based on the study elements feedbacks recorded. Agritourism has not only provided a supplementary income and new employment opportunities to the rural community, but has also increased the conservation of the environment and appreciation of minority cultures and rural lifestyle.

Yet, the development of agritourism is facing a number of challenges. Systemized rules or laws need to be formulated to support farming families establishing and operating tourism enterprises. For every agritourism business success story, there is a counter-story of a farmer or a rancher who got out of the agritourism because it was not profitable and he was continuously losing money.

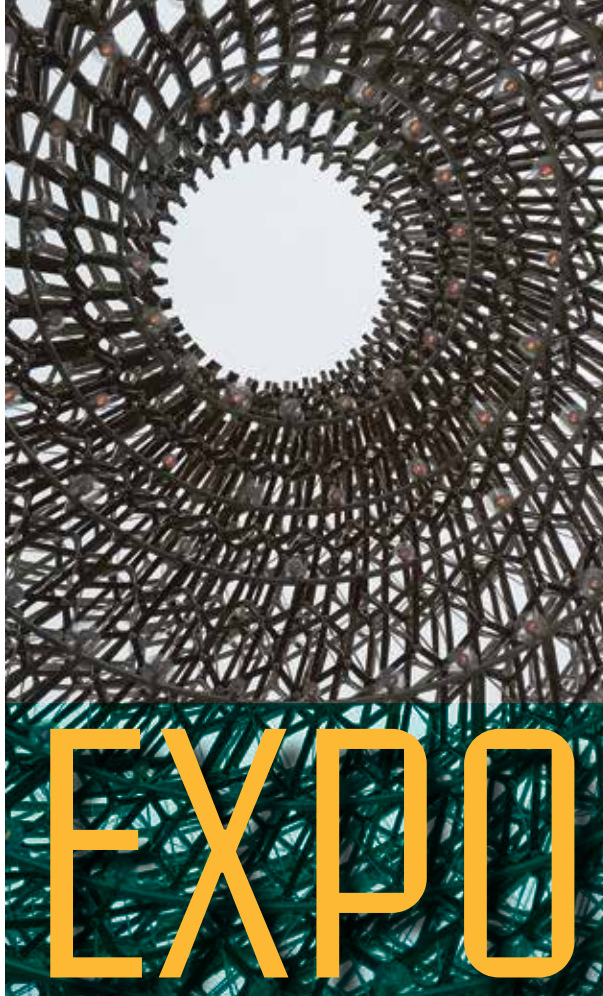
Most surveys of farmers or ranchers find that the business is full of challenges and hardships. Property tax problems, high insurance and liability costs, and the limits of seasonality and weather are few among many problems agritourism operators regularly face.

Marketing for the business in a market that is not quite familiar to this kind of tourism, as in the Egyptian tourism market, is also a challenge. In sum, agritourism has great potential for farmers and ranchers seeking to generate additional revenue, capitalize on underused assets, and educate the public. However, it is not a magic bullet and not all agritourism ventures will succeed.

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EXPO

able to guarantee healthy, safe and sufficient food for everyone, while respecting the Planet and its equilibrium.

As an example, the UK's presence at Expo Milano 2015, with the theme Grown in Britain and Northern Ireland, aims to raise global awareness of and provide innovative solutions to one of the most pressing challenges of our time—how to feed and sustain an expected rise in the world's population to nine billion by 2050.

The UK Pavilion follows the journey of the honey bee to highlight the role of pollination in the global food chain and ecosystem.

Visitors take part in an immersive experience through a British orchard and wildflower meadow with typical native plant species, moving onto a 17 meter-high stylized bee hive in the form of an aluminum sphere. The hive is made up of over 180,000 components and weighs 30 tons. Visitors are surrounded by sounds and lights flickering in response to movements within a real bee hive based in the UK.

We hope that many of the avant-garde ideas and good intentions for a better present and future for humanity presented through this mega-event are implemented in good time to save our resources on the planet and insure their continuity for posterity.

By: Gamal Hosni, Director
Art Exhibitions & Collections Department

2015

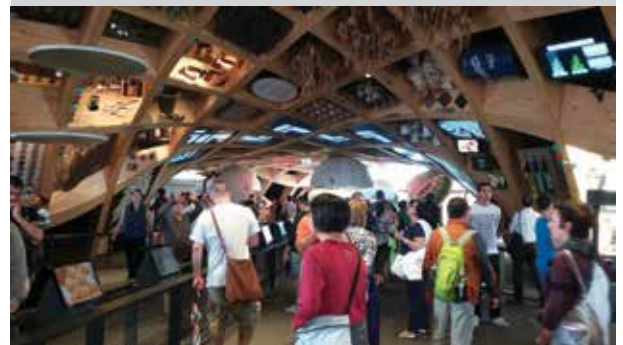
A Universal Exposition or Expo is a major global event that aims at educating the public, sharing innovation, promoting progress and fostering cooperation. It takes the form of a massive gathering of events always spread over a vast area with numerous pavilions each representing a country, an entity or a special theme. It is organized by a host country that invites other countries, companies, international organizations, the private sector, the civil society and the general public to participate. Due to the diversity of its participants, from top decision makers to children, an Expo is a multifaceted event where extraordinary exhibitions, diplomatic encounters, business meetings, public debates and live shows take place at the same time. The Expo is characterized by extravagant display of latest known inventions in any given area and the use of the newest technologies in presentation sometimes even ones that are still in experimentation phases.

Each Expo revolves around a major theme that all participating countries and entities are to forge their contribution around.

This year 2015, Milan was selected as the host-city for the Universal Exposition. Italy then chose "Feeding the Planet, Energy for Life" as its central theme. Expo Milano 2015 talks about the problems of nutrition and the resources of our planet. The idea is to open up a dialogue between international players, and to exchange views on these major challenges which impact everyone.

Considering the importance of this theme, the Italian Government officially invited for participation all member states of the United Nations, Non-Governmental Organizations (NGOs) and companies as key stakeholders in the global debate on the challenges related to nutrition and food.

Over a six-month period, Milan becomes a global showcase where more than 140 participating countries show the best of their technology trying to come up with an answer to a vital need: being



High technology and design are brought to great extents at the French Pavilion. The building, made mainly of laminated wood, spread over a 3,592 square-meter space, is inspired by the covered market, a symbol of French food culture.



A British orchard and wildflower meadow with typical native plant species, moving onto a 17 meter-high stylized beehive in the form of an aluminum sphere.

References

<http://www.bie-paris.org/site/en/>

<http://www.expo2015.org/en/index.html>

image credits:
Gamal Hosni



Food for Healthy Bodies

There is no doubt that food is the key to healthy bodies. This is why the Arab heritage is abound with manuscripts that tackle the cure of many diseases using food; or eliminating diseases by following a specific diet as a pre-stage to using medical prescriptions of combination drug, or both together. Moreover, Muslim scholars divided food and beverages as useful or harmful to the body, describing their impacts; not only because they knew the importance of food for the body's health, but also for the treatment of several diseases.

We find the statement of Najib al-Din Abu Hamid Muhammad al-Samarqandi (d. 619 AH/1222 CE) in the introduction of his book *The Book of Food and Drink for the Healthy*: "I gathered the words of Galen and his commentators hearsays on food and all what human eats that are anthropologically beneficial, and the properties of each. All I found was documented in this volume." In his book, al-Samarqandi classified food and drinks, and their impacts on the body. He also tackled food and drinks recipes, and their usages in treatments for healthy bodies.

In the seventh Hijri century, we find abu Al-Hassan Ala-al-din Ali ibn Abi-Hazm al-Qarshi, known as Ibn al-Nafis (d. 687 AH/1288 CE)—the discoverer of the pulmonary circulation—who wrote a book for the same purpose, entitled *The Choice of Foodstuffs*. He presented in his book the food that we should eat during illness, and described which led to overweight or underweight. That is in addition to his leading contributions in the field.

Abu Ali al-Husayn ibn Abd Allah ibn Sina (427 AH/1037 CE)—also known as *al-Sheikh al-Rais* (meaning leader among

wise men), and by the Latinized version of his name Avicenna—had a famous quote that stated: "Beware of overeating; food debris are the reason for most illnesses". He presented different food types in his book *Repelling All Harm from Human Bodies*, which he authored in seven treatises. The fourth treatise was concerned with food, its types, and harmful effects on human health.

Likewise, the botanist and pharmacist ibn al-Baitar abu Muhammad Diya al-Din al-Malaqi (d. 645 AH/1248 CE) was one of the greatest Medieval scholars. Born in Málaga, educated in Seville and lived in Egypt, ibn al-Baitar passed away in Damascus at the age of 49, after he was poisoned by a plant tested for producing medicine. He authored his book *The Compendium on Simple Medicaments and Foods* for the same purpose, which is treatment using medicine and food.

Ibn al-Baitar also discovered a plant named *Hindiba*—Cichorium is its scientific name—for curing cancer. We may contemplate his words cited in his book, which identify the modern approach rules of scientific research: "I only considered what proved right by observation and experiment, and I excluded what is opposite to opinions, procedures, sensory observations, and essence of the right".

If we go back to the third and fourth Hijri centuries, we will be dazzled by "one of the greatest humanitarian physicians of all times" as described by the Orientalist Sigrid Hunke: al-Razi Abu Bakr Muhammad ibn Zakariya (d. 313 AH/925 CE). Al-Razi authored *The Comprehensive Book on Medicine* (also known in English as *The Virtuous Life*), which lasted as a medical reference in

Europe for 400 years. He also amazes us by his book *Food and Its Harmfulness*, which he concluded by a chapter about choosing useful and appropriate food for human health after he categorized eating and food and their effect.

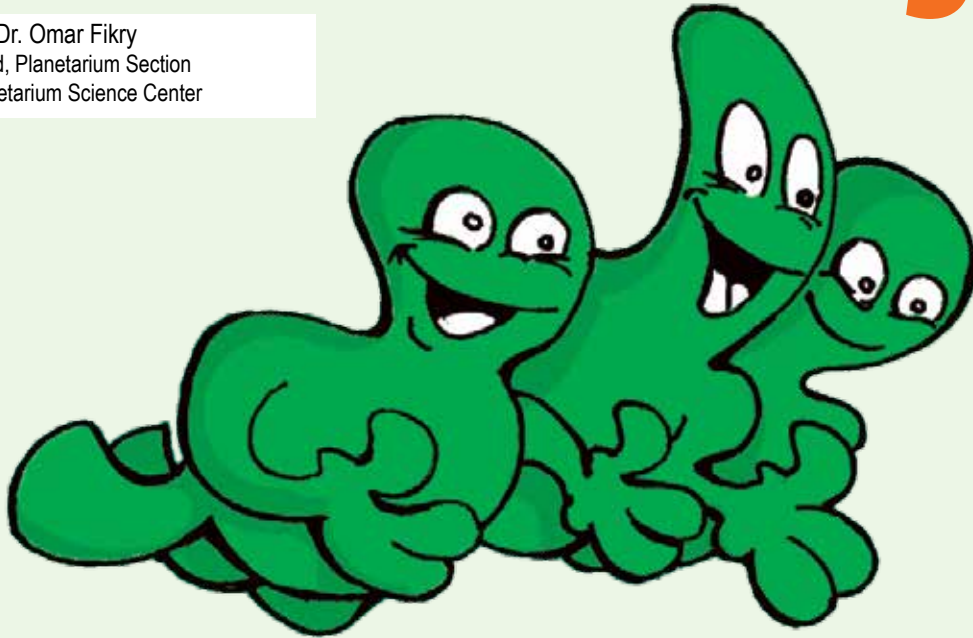
Al-Razi is also the author of *Treating the Diseases by Food and Drugs*, which included 37 chapters, in which he presented treatment methods using diet and medicines for diseases, such as headache, epilepsy, forgetfulness, mind corruption, and eye ailments. By mind corruption here, he meant mental and psychological diseases, after he presented body diseases "from head to feet", as he described.

Furthermore, we have several books in our Arab heritage, in which the authors tackled the principles of proper nutrition, diet regimes, measures for getting rid of obesity and overweight, treating underweight, and that is what is newly called dietary treatment. We may recall, for example, *Diets* by Abu-Zakariya Yahya ibn Masawaih (d. 243 AH/857 CE), *Healthy Measures Relating to Food and Drinks* by Hunayn ibn Ishaq (d. 260 AH/873 CE), and *Poem in Food and Antidote* by Lisan ad-Din ibn al-Khatib (d. 776 AH/1374 CE).

On the other hand, the Arab civilization knew recipes for food preparation, presentation and etiquette, but we cannot state them all here. Yet, we could mention *Proper Conduct in Eating* by Ibn Imad al-Din al-Aqfahsi (d. 808 AH/1405 CE) and *Foodstuffs Measures* by Al-Kindi (265 AH/873 CE). At the end, I would like you to remember the common saying: "The stomach is the home of disease and restraint is the basis of remedy".

Exploring the Human Civilization Enigma

By: Dr. Omar Fikry
Head, Planetarium Section
Planetarium Science Center



Dear Reader, the human civilization is not an enigma; it has its causes and basics that essentially support it. Before you continue reading the following lines, I recommend you read the previous seven episodes if you have not read them yet at <http://goo.gl/uEJCDk> because they are related to the topic in this final episode.

The strange creatures who visited you at your home to converse and discuss with you are real characters amongst us. The tallest, the fattest, and the shortest live with us and we see them daily wherever we go, with the same mentality and physical features.

Who wants to live on this planet with its growing pollution, ignorance, and lack of conscious? That is what the shortest called for in the previous episodes. Who have not met the pedant who talks like a playback record and everyone wants him to shut up? This is the fattest. The tallest appears to be their leader whom they follow and obey; this kind of leading character lives among us also.

Back to your final story with your visitors; the previous episode ended with you screaming in their faces, demanding

to know their identity and the truth behind their visit. The tallest calms you down, saying: "We come from a faraway galaxy called 'Andromeda', located about 2.5 million light years from here; it is known to be the twin of your galaxy, the 'Milky Way'. The reason behind our visit is to substitute you on Earth". You are surprised by his words, but he does not allow you to interrupt and continues "Do not be surprised my friend; we are your copies and our number there equals your number here on Earth. When we saw the situation here, our trip was long and we chose you among others to tell you the mission we came for."

This time, you reply impatiently "What? Do you mean that you have visited other people?" The fattest answers you "Yes, yes, but they were different in culture, shape, religion, color, way of talking and expression. At the end of these visits, we concluded that..." The tallest interrupts him "Wait my friend, do not continue; he may not stand the rest of your story". You answer excitedly "No, no, let him continue; what do you mean by saying that I will not stand the rest of

the story? I heard and saw from you a lot of things that would scare anyone else, but I am still normal and talking to you." The tallest replies "Sure my friend, you are one in a few special persons on this planet; you are brave, open minded, and smart."

When we asked you for a place to talk to Earth's inhabitants, we were thinking of announcing our idea, but it seems that it is not a good idea because it is not necessary that what you heard, comprehended, and accepted would be understood and accepted by the rest of the Earthlings. Our conversation with you tonight is enough for us and we will communicate with our colleagues in this mission to reevaluate our meetings."

The fattest interrupts: "What are you saying buddy? Do you mean that we may change our plan in substituting the Earthlings?" The tallest answers "No, nothing will change; we will replace them. Every one of us will replace the one similar to him; the tallest creature replaces the tallest Earthling, the fattest replaces the fattest, and the shortest replaces the shortest, every consort

VISITORS INFO



Planetarium

Available Shows

Stars Show

45 min. Live Show by the PSC Resident Astronomer

Oasis in Space

25 min. Full-dome Show

Stars of the Pharaohs

35 min. Full-dome Show

Seven Wonders

30 min. Full-dome Show

The Life of Trees

33 min. Full-dome Show

Kaluoka'hina

35 min. Full-dome Show

Mystery of the Nile

45 min. IMAX Show

Cosmic Voyage

35 min. IMAX Show

Alexandria, The Cradle of Astronomy

22 min. Full-dome Show

Visitors INFO

- For the Planetarium daily schedule and fees, please consult the Center's official website: www.bibalex.org/psc
- Kindly note that, for technical reasons, the Planetarium maintains the right to cancel or change shows at any time without prior notification.

History of Science Museum

Visitors INFO

Opening Hours

Sunday–Thursday: [9:30-16:00]
Saturday: [12:00-16:00]

Guided Tours Schedule

Sunday–Thursday:
[10:30, 11:30, 12:30, 13:30, 14:30, 15:30]

- Museum entry fees are included in all Planetarium shows tickets.
- For non-audience of the Planetarium, Museum entry fees are EGP 2.-
- Museum Tours are free for ticket holders.



ALEXploratorium

Visitors INFO

Discovery Zone

Opening Hours

Sunday–Thursday: [9:30-16:00]
Tuesday: [9:30-12:30]
Saturday: [12:00-16:00]

Guided Tours Schedule

Sunday, Monday, Wednesday,
Thursday: [9:30, 11:00, 12:30, 14:30]
Saturday: [12:00, 14:00]
Tuesday: [9:30, 11:00]

Entry Fees

Students: EGP 5.-
Non-students: EGP 10.-

Listen and Discover

- For the list of shows available at the "Listen and Discover" and the schedule, please consult the Center's official website: www.bibalex.org/psc.
- For reservation, please contact the PSC Administrator, at least one week before the desired date.

Show fees

DVD shows:

Students: EGP 2.-
Non-students: EGP 4.-

3D shows:

Students: EGP 5.-
Non-students: EGP 10.-

4D shows:

Students: EGP 10.-
Non-students: EGP 15.-

replaces the person who is similar to him in shape and specifications." You rub your eyes, bewildered by what you have heard; when you remove your hands off your face you do not find them!

Just like that? You ask yourself while searching for them in the entire room; behind the curtains, under the bed, behind the door. You look out from your room window to find that it is morning and a new day is about to start; you look behind you doubting their existence, then you look to the street again and you do not know whether to believe what happened or not. You finally sit on the nearest chair in mere disbelief; then you become sure that all what you have experienced is true not a dream and not insanity.

You ask yourself "Why not? This is indeed the perfect solution for a new civilization to rise on Earth. Yes, there is no way to renovating this planet other than substituting ourselves with virtuous creatures that have a strong will to reconstruct this planet, and work on resurrecting the meanings of justice and beauty in our life". You hear knocking on your room's door beckoning you to go have your breakfast and start your day.

You leave your house with a smile on your face; you focus on everything and everyone around you, and you contemplate the faces of your friends and colleagues. Is it possible that the substitution has happened and we have changed? Or have it not happened yet? Your smile turns into a grin when you see a very tall person, a very short or a very fat one; you conclude that the human being, may he be short or very short, tall or very tall, fat or very fat, is the epitome of human civilization by his thoughts and characteristics.

Fresh from Mars

