

## NATURE LAB

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### Days of Science Introduction

Days of Science, known as Ayam Al Ouloum, is organized by the Ministry of Culture in collaboration with the municipality of Geneva, the municipality of Beirut, and the embassy of Switzerland in Lebanon. This event is designed to encourage academic and research institutes, scientific research laboratories, individual scientists, industries, companies, students, independent individuals, and non-governmental organizations (NGOs) to consider organizing and implementing any of a wide variety of activities that could bring science closer to a wider audience of all age spectators.

For the past two years, The Nature Conservation Center for Sustainable Futures (*ibsar*) participated in Ayam Al Ouloum which took place at the Beirut Hippodrome in October 2008 and October 2009. In 2008, the “Celebrate Biodiversity” concept gave kids the freedom to express their artistic skills using all type of paint in addition to experiencing a series of interactive educational games and short movies designed to entertain and educate. In the following year, *ibsar* in collaboration with Assabil Network of public libraries and the Center for Civic Engagement and Community Service (CCECS) participated in Ayam Al Ouloum with the concept of “Khalik Baladi”; Let’s Go Native which included games, experiments; recycling of papers using banana leaves and measurement of nicotine in nargileh and cigarettes, and crafts raising awareness about the native biodiversity of Lebanon (Including native herbs, trees and fruits). Mr. Ahmed El Aideh, with the *ibsar* Biokids team, prepared stories about biodiversity which proved to be effective in prompting awareness and guidance among children as well as among parents. Although very successful, our scientific contribution was limited due to budget constraint.

The theme proposed by *ibsar* this year is “Nature Lab” which will symbolize a laboratory setting dealing with Experimental Science in relation to biodiversity since this year was named by the United Nations as the year of biodiversity; the year of celebration of life on earth and of the value of biodiversity on human lives. For this very reason, *ibsar* plans to focus on bringing Nature to the Science Laboratory, transform it into household products and offer it back to Nature in a biodegradable form. Nature Lab will contribute to awareness and education in addition to preserving this peculiarity in Lebanon. Our aim is to conduct interactive experiments that stress on the importance of preserving biodiversity, by proposing alternatives to certain actions and/or chemicals which affect nature adversely on a larger scale. These activities include recycling, utilization of biodegradable materials, renewable sources of energy and eco-friendly derivatives. The majority of these experiments have been selected from the IBDA Book of Proceedings of the years 2008, 2009 and 2010, which are in themselves ideas stemming from the innovative creativity of environmentally aware AUB students.

## Nature Values in Presented Experiments

- 1. Heat Without Fire:** Without the greenhouse effect, life on Earth would probably not exist as the temperature would be a chilly  $-18^{\circ}\text{C}$ . About 51% of the sun's radiation reaches the earth's surface causing it to become a radiator of energy that is reflected back into space. However only a small portion actually reaches space, the majority is absorbed by greenhouse gases where over 90% is directed back to the earth's surface. A number of gases are involved in the human caused enhancement of the greenhouse effect where  $\text{CO}_2$  accounts for 63% of this change. An increase of more than  $2^{\circ}\text{C}$  would be enough to severely degrade the availability of food and water in developing countries. Modern heating methods are a major contributor of  $\text{CO}_2$ , whereas this experiment provides an eco-friendly method with no  $\text{CO}_2$  emission.
- 2. Photo Album and Medicine Boxes:** When considering the numbers projected due to recycling, the need is pretty self explanatory. Every ton of paper that is recycled saves 17 trees. The energy saved when one glass bottle is recycled is enough to light a light bulb for four hours. Recycling creates a net reduction in 10 major categories of air pollutants and 8 major categories of water pollutants. On average, a national recycling rate of 30% reduces greenhouse gas emissions as much as removing nearly 25 million cars from the road. This experiment proves that recycling can be done anywhere and everywhere.
- 3. Biodegradable Pots from Carob Powder:** The molecular bonds that make plastic so durable make it equally resistant to natural processes of degradation. Since the 1950s, one billion tons of plastic have been discarded and may persist for hundreds or even thousands of years and their burning causes the release toxic fumes and chemical pollutants. This experiment provides an organic plastic substitute that also provides a benefit for the nature of its use.
- 4. Composting/Vermi Composting:** One of the major concerns of chemical fertilizers is Nitrogen emission, where in the past 100 years, emissions have risen from around 20m tons to more than 150m tons a year. As an ingredient in fertilizer, nitrogen helps to feed some 2 billion people, but when it is washed from soils into water courses it can make rivers and lakes too rich in nutrients. As a result, algae and other life can grow out of control, eventually stripping oxygen from the water which fish and other aquatic life need creating dead zones. Composting provides an eco-friendly alternative to chemical fertilizers through the recycling of house-hold, and plant organic waste.
- 5. Light and Enlighten:** Humans are pouring carbon dioxide and other greenhouse gases into the atmosphere much faster than plants and oceans can absorb it, largely due to the use of fossil fuels for providing energy. These gases persist in the atmosphere for years, meaning that even if such emissions were eliminated today, it would not immediately stop global warming. On the other hand, fossil fuels are running out and clearly, humankind has to set a different course in its need for energy, one that involves less intrusive sources such as solar, wind and geothermal energy. They are energy sources that don't harm the planet and will never run out. This experiment provides one such eco-friendly energy source.
- 6. Air Purifier:** Ethylene-based glycol ethers are common, water-soluble solvents used in a variety of cleaning agents, latex paints and air fresheners. They are classified as hazardous air pollutants under the U.S. Environmental Protection Agency's 1990 Clean Air Act Amendments and as toxic air

contaminants by California's Air Resources Board. Terpenes are a class of chemicals found in pine, lemon and orange oils that are used in many consumer products either as solvents or to provide a distinctive scent. Although terpenes themselves are not considered toxic, some recent studies have shown that they may react with ozone to produce a number of toxic compounds. This experiment provides a 100% green air purifying method.

**7. Sage not Rage:** Chemical deterrents are commonly used to shield off insects. They become a problem when they are washed off into household water supplies and dumped in natural water sources. This experiment provides an ecologically friendly insecticide cream that has been developed purely from organic sources.

**8. Oily Hair:** Fur and feathers are an oil spill best friend. When animals unknowingly enter into an oil spill, it sticks to their coats causing them to drown. In addition direct ingestion of oil is fatal. Plankton, the smallest organisms, are also affected by oil spills with this effect moving right up the food chain leading to indirect death. This experiment not only shows the adverse effects of this on mammals and birds, but also an effective method of using hair in cleaning up oil spills.

**9. Acid Attack:** Acid rain is caused by industrial emissions of ammonium, carbon, nitrogen, and sulfur which react with the water molecules in the atmosphere. Acid rain eats away at the earth's surface and poisons natural water sources. This experiment shows the effect of a home-made acid, almost less than half as acidic as acid rain and its effect on chalk, synonymous to the rocky surface of the earth.

**10. Colors of Carrots:** Plants are a rich source of untapped potential. They contain a multitude of chemicals that can and are already being used in a variety of purposes, including medicinal and essential oil. The purpose of this experiment is to show the rich reservoir of molecules available to us, and how they can be separated and identified. Inherently this experiment aims to stress the important of plants not just as oxygen providers but also as natural gold mines.