

Discuss the importance of plants on planet earth

Plants As We See Them

Plants are all around us, renowned for their aesthetic appeal; their colours and structures lend themselves to decoration. Plants are used in celebrations and commiserations and are often celebrated in their own right- the annual Michigan potato festival being a good example. Plants are associated with national identity. The Scottish thistle; Irish Shamrock; Welsh leeks and daffodils. Many national flags feature plants, the Cedar tree on the Lebanese flag, and the Maple leaf on the Canadian flag. However all of these commendations cannot begin to celebrate the real importance of plants on planet earth. In this essay I will explore the biological and physical importance of plants and the issues surrounding them.

The Real Importance

For millions of years the chemical needs of the biosphere have run on solar energy. Plants (along with some bacteria and green algae) are autotrophs that have the ability to convert this solar energy into chemical energy by a process called photosynthesis. This chemical energy, stored in plants is the fuel that sustains life .

PHOTOSYNTHESIS: The Light Reaction.

Photosynthesis takes place in the leaves of plants. There are two stages; the light-dependant or light reaction and the light-independent or dark reaction. In photosynthesis the light reaction, for which the presence of chlorophyll (the green pigment found in the chloroplasts) is essential, begins with the absorption of sunlight in the blue and red wavelengths. The light is absorbed by one of the numerous light harvesting areas found in the thylakoid membranes, structures present in the grana. In the light reaction energy is converted into ATP and NADPH. Water, obtained through the roots and stem of the plant, is split, and as a by-product, Oxygen is released. This 'by-product' has a major impact on the biosphere. Today's atmosphere would not have 21% oxygen if it were not for photosynthesis.

The Dark Reaction

Also found in the chloroplasts is a fluid filled region called the stroma. This structure contains most of the enzymes needed for the light independent or dark reaction, the process that converts

Carbon Dioxide to Glucose. The dark reaction depends on the ATP and NADPH obtained from the light reaction. Carbon dioxide obtained by the plant from the atmosphere through the stomata in the leaves, bonds with Hydrogen and Oxygen from the water and from the atmosphere to form carbohydrates in the form of glucose ($C_6H_{12}O_6 + 6O_2$). The carbohydrates, stored in the leaves of plants, makes them a valuable foodstuff for humans and animals. Situated near the bottom of the food chain plants nourish our food, the herbivores we breed to eat, and us.

Roots

The roots of plants, hidden from view by soil also play a very important role in sustaining life on planet earth. It is the roots of a plant that remove water and nutrients from the soil, both essentials for photosynthesis. Plant roots break up rocks, which become part of new soil and roots loosen the soil, allowing oxygen to penetrate. This benefits ground dwelling organisms, such as shrews, rabbits and earthworms that all have their part to play in the ecosystem.

Botanical Industry

Arable farming, particularly in parts of Scotland, is a main provider of employment and a main contributor to local economies. The vast majority of our fruit and vegetables are grown on a farm somewhere in the world. The ability to grow and control the growth of plants is essential, particularly to those in the third world who may have no other source of income or indeed, food.

Controversial Plants

Genetic Modification is a phrase that strikes fear in to the hearts of 'environmentalists' and Liberal Democrats alike. Genetic modification of plants took place in its very simplest form even before Gregor Mendel started tinkering with Peas in 1857. Perhaps this is the way forward? Better disease resistance, larger crop yields anti-carcinogenic carrots; these are all good things. I certainly look forward to slice-of- bread shaped tomatoes. In the future perhaps technology and botany can combine in perfect harmony, if it is wise to do so. It was thought wise by technologists to disregard the dietary preferences of herbivores, resulting in B.S.E and subsequently vC.J.D.

Plants In Medicine

Many plants have medicinal uses. Aspirin, from the bark of the Willow tree, is a widely used and important drug. Aloe Vera, a succulent plant has many health applications. More recently rubber plants have been genetically modified to produce sap containing the human serum albumin, an essential nutrient used to treat those who are critically ill. It is amusing to think that the health properties of many plants, St. Johns Wort, hailed as a new wonder remedy for depression and Peppermint, an aid for digestion, are at present viewed as the big new thing. For centuries people relied on plants and their various properties to cure illness and maintain good health, until they were shunned in favour of 'conventional medicine'

In Conclusion

Plants are all around us. Medicinally we are turning to plants (again!) to provide remedies for the stresses and strains of modern living. Plants provide income and food. Yet few of us stop to consider their real importance. Seen mainly as decorative organisms, not often given credit for providing oxygen and food without which there would be no life on earth. Genetic modification would appear to be a positive step. Plants, as wonderful as they are, need to keep up with the times; we demand more from our flora. Providing oxygen for us to breathe and food for us to eat simply isn't enough anymore.