

## Green Plants

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Subject : Biology

Case study : The scientific study of the number of colours in a plant, the purpose of the colours and their importance to the plants.

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An Introduction to 'Green Plants'

Green plants is a biological name that generalizes the colour in all plants. The colour is perhaps used to differentiate them from animal kingdom. But the term 'Green' does not imply that a plant is purely green. A close outlook shows that a single plant has got more than one colour apart from green plants.

Definition : Green plants are impure living matter whose components of colours are more than one.

Origin of colours and how they are used by plants

Colours are in form of mineral ions which are either positive (+ve) or negative (-ve) ions.

Positive Minerals (ions) salts

Positive mineral ions are mineral salts which are found in the soil and always dissolved in water. These are:  $K^+$ ,  $Mg^{+2}$ ,  $Ca^{+2}$ ,  $Fe^{+2}$  and  $Fe^{+3}$  and  $NH_3^+$ . These mineral salts are used to trap colours from the clouds.

Negative minerals (ions) salts

Negative mineral ions are gaseous particles which are in form of  $S^{-2}$ ,  $Cl^-$ , and  $PO_4^{-2}$  ions and  $N^-$  or  $N^{-2}$  and  $\frac{1}{2}(O_8^8)$  or  $\frac{1}{2}(O_6^8)$ . The charts below shows how colours are arranged in the atmosphere and how positive mineral salts attract them.

### 1. Green colour

Green colour means environmental conditions to which a plant is adapted to. The condition range from cool, cooler to coolest or warm, warmer to warmest. For example a plant which is adapted to the coolest environment is a damp waters cannot survive in the warmest place in a desert and the vice versa. The green pigment therefore allows the plants to open and close its stomata according to that environmental conditions. Other uses are :

- Form plant petals
- Acts as a respiratory system

### 2. Yellow colour

Apart from green colour, there is a yellow colour beneath it. Most of the plants expose yellow colour on their fruits during ripening stage e.g a banana plant or a pawpaw plant. It is also important for the skeletal structure of the leaves and stem. The perfume coming from leaves such as a tomato plant or sweet smell from wild flowers is of yellow  $Cl^-$  and  $S^{-2}$  ions respectively. Yellow colour originates from clouds.

### 3. Purple colour

Purple colour means growth, balance or protection. In other words it is a balance or protection between the internal environment of the plant cells and the external atmospheric air for the sake of the development and growth of the plant. Other uses are:

- As protein synthesis to the plant.
- Formation of plant roots.
- For flowering during pollination (white colouring)
- For ripening of fruits e.g an apple.

The purple colour originates from nitrogen in the atmospheric air and exists in plants as  $NH_3^+$ .

### 4. Blue colour

Some plants need a multiple of more than one colour apart from purple in order for their internal body cell to balance with that of the external environment of the atmosphere. Blue colour is brought about by the addition of different minerals such as  $Mg^{+2}$  or  $\frac{1}{2} Ca^{+2}$  ions in the plants. At some given temperature of coldness during the night, it makes the magnesium ions to contract. During the daytime the ions attracts oxygen ions from the atmosphere in the plant leaves or flowers.

Examples of plants studied are:

- A) The Lantana camara plant( Blue fruits)  
 B) A Bean plant ( Three leaflets and 2½ sepals)

#### 5. Orange and Indigo colours

- (i) Orange colour is formed when nitrogen gas molecules in the atmosphere cools down to form four sub- atoms of carbon , with double bond between them. The orange colour is mostly used for flowering.  
 (ii) Indigo colour is formed when nitrogen gas molecules in the atmosphere cools down to form four sub- atoms of carbon with single bond between them. Indigo colour is also used for flowering.

#### 6. Red colour

Red colour comes from two minerals :

- i. Iron (iii)  $Fe^{+3}$
- ii. Red Phosphate ions ( $PO_4^{-2}$ )

Iron (iii) originates from the soil and Red Phosphate originates from the clouds. Iron (iii) is used for flowing during pollination by attracting yellow  $Cl^-$  ions and red  $PO_4^{-2}$  is used for the formation of fruits and is attracted by  $Mg^{+2}$  ions . it is also used for the final colouring of the fruits e.g a tomato plant and bean plants.

#### 7. Black and White colours

White and black colours originates from  $PO_4^{-2}$  ions in clouds and can act as substitutes or both of that of the purple colour. This is because of different genetic material in plants that require different colour for other purposes. White and black colours are mostly seen during dispersal of seeds and their signifies the maturity of the offspring of the species of the plant. Other plants used black and white colours for flowering.

### Draft Paper Number 3

Topic: The Rainbow colours

Origin: Isaac Newton

Definition: This is a condition in the atmosphere showing different levels of temperatures , between cool and warm, in which the particles of molecules of gases are split by the sun's radiant energy and then converted into chemical ions which are covalently bonded together in different ways to give seven visible colours and two invisible colours.

- Visible colours are: Violet, indigo, green, blue ,yellow ,orange and red in that order .
- Invisible colours are : white and black colours.

Both visible and invisible colours are ultravioleted into the ground with relative speed equal to that of light energy.

There are two groups of gases existing in the atmosphere. These are clouds gases and atmospheric air.

#### Clouds gases

Clouds gases are groups of ammonium compounds containing chloride ions , sulphite ions and phosphate ions.

#### Atmospheric gases

The atmospheric gases are: nitrogen and oxygen gases.

##### i. Nitrogen gas

When Nitrogen is ionized by light energy it produces three colours namely:

1. Violet or purple colour
2. Orange colour
3. Indigo colour

##### ii. Oxygen gas

when oxygen gas is ionized by light energy, it produces one colour which is Blue.

Yellow colour in the clouds is produced by Sulphite, chloride and phosphate ions.

Green colour is produced by chloride ions.

Red colour is produced by phosphate ions

Black and white are also produced by phosphate ions

#### Importance of colours in both plants and animals

- Colours are therefore chemical ions in form of minerals. Plants uses these minerals for growth and development and also for flowering
- Colours are sources of genetic materials that can be transferred from one generation to the other.
- The importance of green colour is for 'cool', purple or violet colour is for 'protection', yellow colour to produce acidic substance , blue basic substances.
- Different plants need specific minerals ions for growth and development. These specific minerals make a plant to look unique. Colours provide specific for each plant for specific functions.