

Soil Fertility Concept

Soil Fertility Concept- India is mainly a land of agriculture. Since ancient times people have been doing cultivation of land to grow crops for their food and livelihood. They used to add manures to the soil to get better crops. The land suitable for cultivation was termed as **fertile land** even in vedic period.

The development of concept of soil fertility from early times may briefly be described as follows:

1. Columella, a prominent Roman writer, in 60 A.C., described soil fertility in detail in his book, Husbandary.

2. Development of Salt and Vegetation Theory: In 1563, Bernard Plassy, a French, told that the ash obtained by burning the plants, contains the fraction absorbed by the plants from the soil. **Francis Becker (1561-1626)**, an English thinker told that water is the main nutrient of plants. According to him, the function of the soil is to keep the plants to stand straight and to save them from cold and heat. **J.R. Glauber (1604 - 1668)**, a German chemist, discovered that nitre or salt peter is very important in plant nutrition. He showed that nitre is obtained from the cow dung and urine of animals at farmyard and it forms from the fodder formed from plants. The addition of these materials in soil increases growth of plants. This is called Glauber's vegetation theory.

3. Development of Humus Theory: John Woodward, an English, in around 1700 showed that black coloured organic compound called humus is very useful for proper plant growth. Around 1800, Prof. J. G. Valarius included basic phosphate as nutrient for plants. In nineteenth century, **Wholer, a German scientist, synthesized urea in 1828** in the laboratory and changed the concept of vital for: theory of formation of organic compounds. **Theodore de Sassure (1767-1845)**, a Geneva native, studied the effect of air on plants and the source of salts in plants. He showed that:

- (i) Plants absorb oxygen and liberate carbon dioxide.
- (ii) in presence of sunlight, plants absorb CO₂, and liberate O₂.
- (iii) The source of nitrogen in plants is soil and not air.
- (iv) The normal nutrition of plants does not take place in the absence of nitrates and mineral salts.
- (v) The roots of plants expand inside the soil and absorb water more readily than salts.

de Sassure was of the view that air is source of carbon to the plants. But **Prof. Davy of Soil Institute, London showed in 1833** that plants absorb major part of carbon by the roots. **J.J. Berzelius (1838)** was also of the view that the plants get their carbon from humus.

4. Development of Lebig Theory **Lesbie**, an organic chemist of Germany in 1940 suggested that:

- (i) Major part of carbon in plants comes from carbon dioxide.
- (ii) Hydrogen and oxygen are provided by water
- (iii) Phosphate is essential for seed formation.
- (iv) Plants got nitrogen from ammonia which is obtained by the plants from the soil or air or both.
- (v) Potassium silicate is essential for the growth of grasses and cereals. According to Lebig, it is essential to maintain the fertility status of the soil that nitrogen and other minerals taken up by the plants should be provided to the soil.

He showed that the absence of even a nutrient affects the plants growth. **Is called Lebig's law of minimum.**

Lebig is actually called the father of agricultural chemistry.

5. Establishment of Rothmasted Agricultural Testing Center: In 1843, **JB Lauz** and **J. H. Gilberth** established an agricultural testing center in London. They discovered that:

- (i) The crops need both phosphorus and potash but the structure of the plant ash cannot tell the requirement of these elements,
- (ii) Non-leguminous crops need nitrogen which is provided by nitrates or ammonium salts.
- (iii) Soil fertility can be maintained by the artificial manures i.e. Fertilizers for some years only
- (iv) If no crop is grown in a soil, its fertility increases due to increase in nitrogenous compounds in it.

6. Thomas way of England in 1852 discovered base exchange process.

7. Use of Micro-Organisms: Around 1970 and 1980, microbial science was found helpful for soil fertility. In 1886, **H. Hellriegel** and **H. Wilfrath** of Germany found that the bacteria found in the nodules of leguminous plants fix the atmospheric nitrogen which is utilized by the plants. In 1882, **M.W.V. Vizeric** named bacillus **radicicola** as **rhizobium**.

In twentieth century, with the advancement of science, a lot of progress has taken place in the field of soil fertility and plant nutrition. Several types of fertilizers have been population produced. These are used to grow better crops to meet the requirement of increasing population.

In 1929-39, **Mastan S.** of Sweden discovered that exchangeable ions adsorb on clay minerals and colloidal humus.

In 1938, **Walksman** studied the mineralization of nutrient elements by soil micro-organisms.

In 1973, **E. Alisan** studied the effect of soil organic matter on crops. According to **Dr.J.S.Kanwar (1982)**, soil is the soul of infinite life.

During **21th century**, the importance of soil fertility has increased a lot because population is increasing fast and natural resources are limited.

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