**THE BEGINNINGS OF AGRICULTURE**.

The earliest hominids or man-like beings first appeared approximately one million years ago and the modern species of man, *Homo sapien* evolved from his ancestors about half a million years ago. For a long time, man lived hunting,fishing and gathering food from nature (random harvest) until he learned the art of growing plants for food not so long ago(by about 8000B.C), which marked the beginnings of agriculture. When man wanted to produce his food intensively instead of merely collecting it from places where it occurred naturally, he began to clear jungles, sow seeds and raise a good harvest. Sooner or later it was realized that the same soil cannot endlessly sustain plant growth and good productivity.

**THE TURNOVER OF CARBON.**

It has been estimated that the atmosphere has about 700 billion tonnes of carbon and almost an equal quantity is locked up in the dead organic matter on land. The living plants on land possess about 450 billion ton of carbon which naturally undergoes interchange with atmospheric carbon. Coal and oil resources, however, account for about 10000billion ton of carbon.

Carbon fixation is the pivotal event in the biosphere and other cycles in nature depend on the extent and magnitude of this process. All organisms on land and sea which possess chlorophyll use solar energy to combine CO2 and H2O and form carbohydrates with the release of O2 into the atmosphere. Part of the carbohydrate is directly consumed by plants for energy and in the process, CO2 is liberated through roots and leaves. Some of the plants carbohydrates are eaten by animals leave behind their remains which are decomposed by microorganisms in soil and in the process, the carbon in their tissues gets converted to CO2.

**THE TURNOVER OF NITROGEN:**

Just as carbon is the key element for the synthesis of carbohydrates, so is nitrogen for the synthesis of protein. The atmosphere is a vast reservoir of nitrogen but the synthesis of protein. The atmosphere is a vast reservoir of nitrogen but the nitrogen of the atmosphere must necessarily combine with H2 or O2 before it can be assimilated by higher plants. The inert atmospheric nitrogen nitrogen occupies approximately 75% by weight, and 78% by volume of the atmosphere and totals 3.8 X 1015 tonnes.

Following table shows the major microbiological processes in soil by free living microorganisms which indirectly influence plant growth.

|  |  |
| --- | --- |
| Nature of microbial process. Examples of microorganisms involved. | |
| Aerobic decomposition of organic matter (cellulose, lignin, chitin etc)  Anaerobic decomposition of organic matter  Non-symbiotic nitrogen fixation(free-living)  Nitrogen immobilization  Nitrogen mineralization  Nitrification  Denitrification  **P**hosphate solubilization  Sulphur transformations  Iron transformations  Manganese transformations  **C**opper transformations | Trichoderma, Achromobacter, Nocardia, Streptomyces.  Clostridium, methane bacteria(Methanobacter and Methanococcus)  Anabaena, Azotobacter, Beijerinckia  Bacteria, fungi and actinomycetes  Pseudomonas, Bacillus, Serratia  Nitrosomonas, Nitrobacter  Pseudomonas,Achromobacter  Pseudomonas, Bacillus, Aspergillus  Thiobacillus, Beggiatoa, Desulfovibrio  Gallionella,Ferribacterium,Leptothrix  Aerobacter, Corynebacterium, Flavobacterium, Cladosporium  Desulfovibrio,Clostridium,Escherichia |

**EFFECT OF AGRICULTURAL PRACTICES ON SOIL ORGANISMS:**

The microbiological aspects of the positive effects of some agricultural practices on soil fertility and crop production has been recently revised.

Tillages, crop rotation and fertilization improve the physical condition of soil; they provide a more favourable reaction for the activities of the numerous soil bacteria and admit large quantities of oxygen which are necessary for the growth of the aerobic organisms. These treatments are of great importance in soil fertility, not only because they produce in the soil favourable physical and chemical conditions for plant growth, but also create more favourable conditions for the activity of the microbes which effect more rapid liberation of the soil nutrients.

However, recent researches showed that soil tillages affect in a favourable way mainly the important groups of micro-organisms involved in the soil organic matter transformation, mineralization and nitrification; but affect unfavourably the most important process bound to the biological soil fertility as the nitrogen fixation by free micro-organisms.

The biological soil fertility is also more stimulated in soils submitted to crop rotation than in soils with monocultures, since the succession of different rhizospheric microbial populations exert a positive effect not only on the organic matter transformation and on biological nitrogen fixation but also against the pathogenic plant microbes.