**Paper- SEI**

**Unit 1: Biofertilizer.**

**Frankia- Isolation, characteristics, Alder, Casurina plants, non-leguminous crop symbiosis.**

**Frankia** is a **Frankia** is a genus of nitrogen-fixing, bacteria that live in symbiosis with actinorhizal plants, similar to the Rhizobium bacteria found in the root nodules of legumes in the family Fabaceae. **Frankia** also initiate the forming of root nodules with actinorhizal plant are known as **Actinorhizal symbiosis.**

The term **actinorhiza** and **actinorhizal plants** is derived from **“action”** for the actinomycete ***Frankia*** named after its discover Frank in the 1880s and **“rhiza”** for the plant root bearing the nodules formed by symbiosis.

**Alder** trees are known to recuperate soil nitrogen in temperate forest ecosystem. Field estimates have shown that alder trees increase the nitrogen content content of soil . Casurina trees release nitrogen indicate the importance of root nodule bearing non-leguminous plants in the overall nitrogen economy of soil.

**Isolation-**

1. Clear the nodules of extraneous organic matter, soil and dirt under running water by frequent examination under a dissecting microscope.
2. Fragment the nodule into individual lobes, sterilize the lobes by immersion into 3.0 % aqueous solution of **osmium tetroxide** for 1-4 min.
3. According to nodule mass and age, wash in sterile distilled water several times and cut the nodule lobes into 0.1-0.5 mm3 pieces with the help of a sterile scalpel.
4. Transfer these nodule pieces into bottom layer of 1.5 per cent of **Yeast Extract Dextrose Medium(YEMA) or Q mod medium with activated charcoal/tween 80.**
5. **Addition of cycloheximide at the concentration of 50µg/ml may be useful for preventing fungal contamination.**
6. Pour 3ml of the same medium over the layer containing nodule pieces, thereby providing microaerphilic conditions and facilitate Frankia growth which can be periodically checked under a dissecting microscope.
7. Seal the pertiplate with paraffin and incubate at 28-30°C.
8. After 4 weeks, colonies of Frankia generally appear at the edge of nodule pieces.

**Cultural Characteristics of Frankia**

1. Exhibit polymorphism of colonies ranging from starfish, diffuse or compact shapes.
2. The hyphae are poorly branched, may be colourless or pigmented depending upon the nature of the medium.
3. Round, cylindrical, stipitate vesicles are formed in nitrogen free medium. These swollen tips of hyphae (vesicles) assume various shapes ranging from pear, club or filamentous types and are regarded as site of nitrogen fixation . vesicles in general posses an intrinsic oxygen protection mechanisms to sustain continued nitogenase activity.

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