EXPERIMENT

AIM

To study the symbiotic association (models/specimen) found in root nodules of leguminous plants, Cuscuta on host and lichens.

THEORY

In nature animals, plants and microbes do not and cannot live in association, but interact in various ways. When two different species interact with each other (Interspecific interaction) and are in close association with each other in such a way that at least one species is benefitted while for other species the relationship may be positive, negative or neutral, such association is called symbiotic relationship.

There are three basic types of symbiotic relationship

- **Mutualism** In this type of symbiotic relationship both the involved organisms benefit from each other.
- **Commensalism** In this type of symbiotic relationship only one organism benefits, while the other is neither benefitted nor harmed.
- **Parasitism** In this type of symbiotic relationship only one organism is benefitted, while the other organism is harmed.

REQUIREMENTS

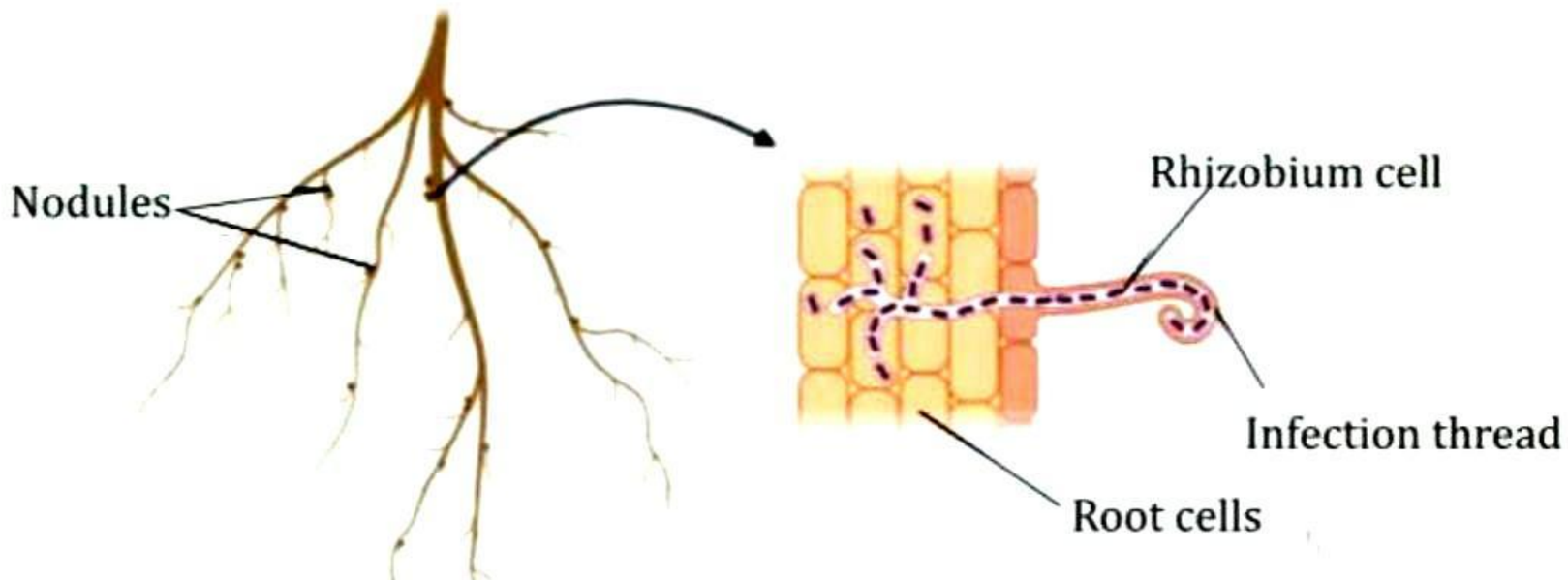
Model/specimen/chart showing symbiotic association in root nodules of leguminous plant (pea plant), Cuscuta on host and a lichen.

PROCEDURE

1. To study the association between the Rhizobium bacterium and roots of leguminous plant, Cuscuta and its host and lichens with the help of model or specimen.
2. Note the special features of each specimen and draw a labelled diagram.
3. Clear your doubts about any kind of symbiotic association by taking help from seniors and teachers.

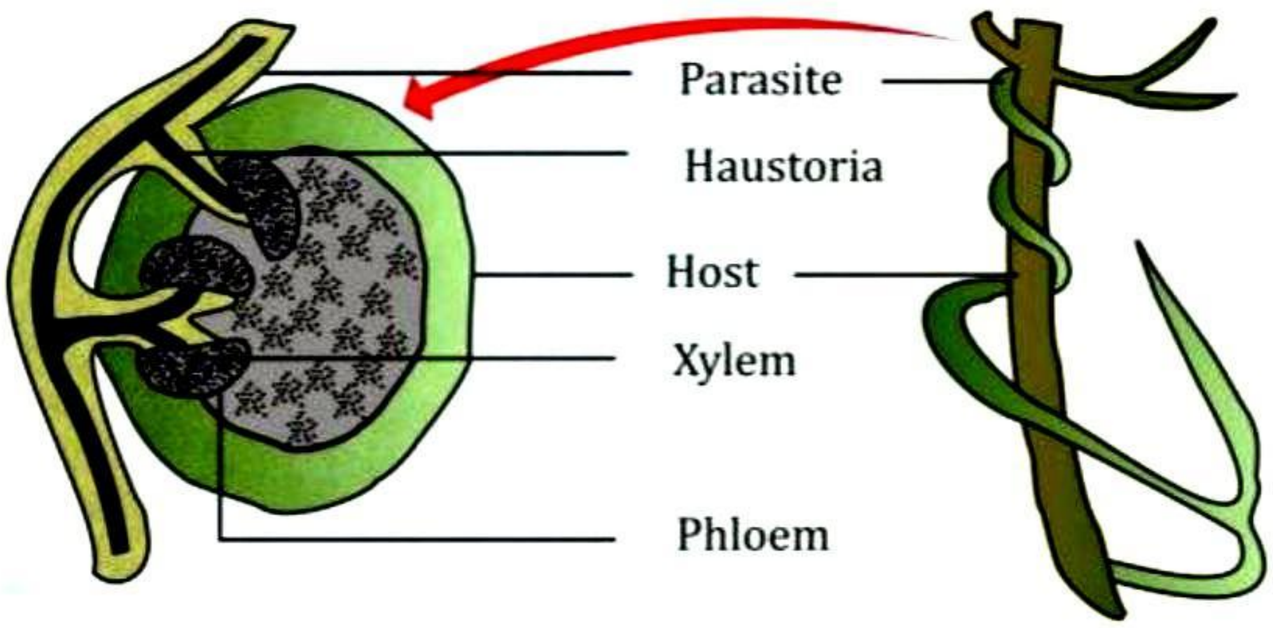
OBSERVATIONS

1. **Rhizobium in root nodules of leguminous plant (pea plant)**
   - **(i)** Rhizobium bacteria are present in the root nodules of leguminous plant and form a symbiotic relationship, i.e. mutualism, where both are benefitted from each other.
   - **(ii)** In this case, the legumes allow rhizobia to infect their roots. This leads to root nodule formation where bacteria are accomodated to convert nitrogen from the air into ammonia that the plant can use for growth.
   - **(iii)** Bacteria receive organic acids from the plant to use as a food source.



Legumes of a leguminous plant infected with Rhizobium

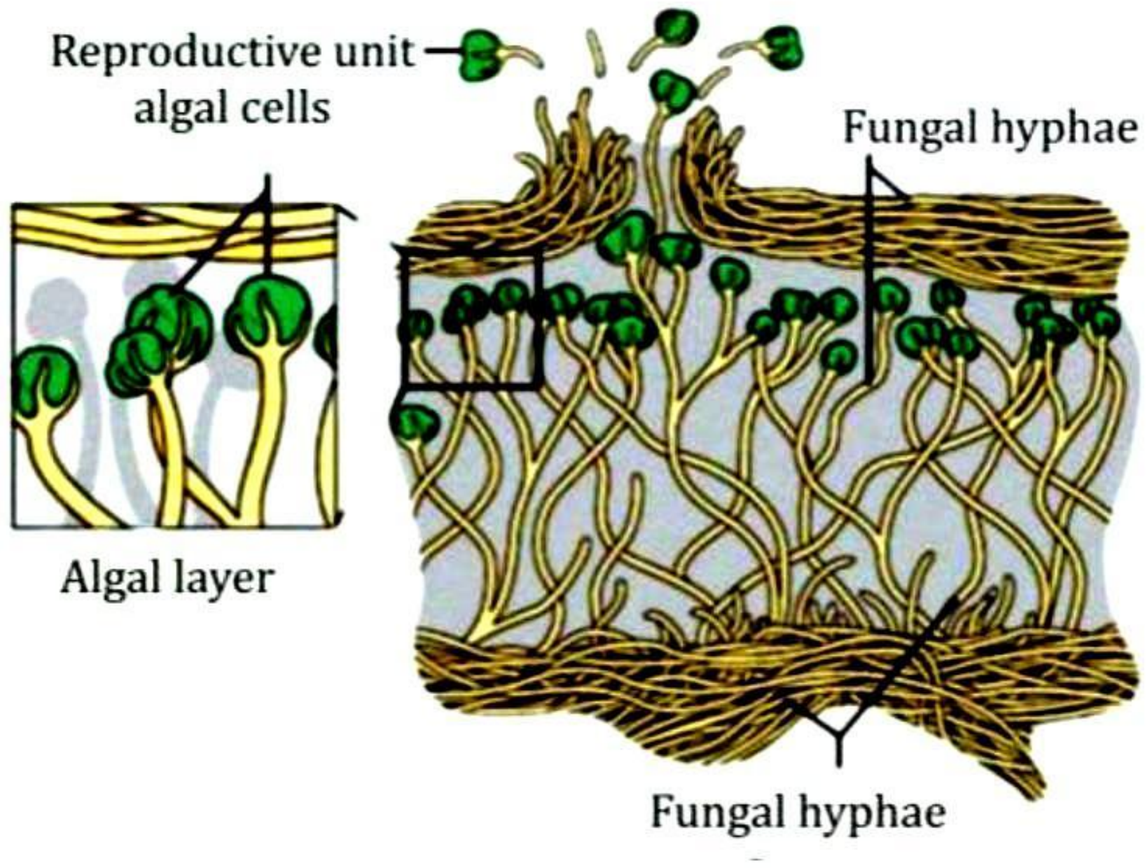
2. **Cuscuta with host**
   - **(i)** Cuscuta commonly called dodder or amerbel and live as stem ectoparasite on other plants.
   - **(ii)** Cuscuta has no fully expanded form of leaves (Scale-like leaves are present) and has no chlorophyll.
   - **(iii)** Stem of Cuscuta is thin and slender shaped and it winds around the stem of host plant.
   - **(iv)** Stem of Cuscuta fixes itself to the stem of host plant with special structure called haustoria.
   - **(v)** Haustoria form direct connection to the vascular bundles of the host and withdraw, water carbohydrates and other solutes.
   - **(vi)** Roots of Cuscuta are temporary and die as soon as it makes connection with host plant.
   - **(vii)** Cuscuta can weaken or kill plant and reduce crop yield. This type of relationship is called parasitism.



(a) Cuscuta on the host, (b) TS of host along with Cuscuta

3. **Lichens**
   - **(i)** Lichens are composite organisms representing a symbiotic association (mutualism) between fungus and algae
   - **(ii)** The algal component is known as phycobiont and fungal component is known as mycobiont
   - **(iii)** Algae prepare food for fungi and fungi provide sheiter and absorb mineral nutrients and water for its partner.

(iv) They grow on lands, rocks, tree trunks and walls of houses, like dry vegetation.



VIVA VOCE

Q1. What is symbiosis?

Ans. A relationship between two different living things living close to one another and depending on each other in particular ways.

Q2. What are different types of symbiotic relationships?

Ans. There are five types of symbiotic relationships, mutualism, commensalism, parasitism, competition and predation.

Q3. What are lichens?

Ans. Lichens are the close association of algae and fungi. Together they provide each other with food and Shelter.

Q4. What is the role played by Rhizobium bacterium in leguminous plants?

Ans. The bacteria attached to the roots of leguminous plant and produces nodules. In these nodules rhizobia fiv atmospheric nitrogen and convert it into ammonia that plant can use for growth.

Q5. Give an example of parasitic symbiotic relationship.

Ans. Cuscuta and the host plant.

Q6. What are the organisms that feed on plant sap and other plant parts called?

Ans. The organisms that feed on plant sap and other parts of plants are termed as phytophagous.

Q7. Mention how closely related species of warblers are able to co-exist in a competitive environment.

Ans. The warblers species are able to co-exist in a competitive environment due to behavioural differences in their foraging activities.

Q8. State the type of interaction that exists between ticks and dogs.

Ans. Parasitism (Ectoparasite).

Q9. Give the name of two parasitic plants and two parasitic animals.

Ans. Parasitic plants are Cuscuta and Viscum and parasitic animals are mites and lice.

Q10. Name the two intermediate hosts on which the human liver fluke depends to complete its life cycle so as to facilitate parasitisation of its primary host.

Ans. The human liver fluke requires two intermediate hosts, i.e. freshwater snail and fish to complete its life cycle and facilitates parasitisation of its primary host.

Q11. An orchid plant is growing on the branch of mango tree. How do you describe this interaction between the orchid and mango tree?

Ans. Orchid is an epiphytic plant that grows on a mango tree branch and they together show commensalism. In this interaction, orchid is benefitted and the mango tree is neither harmed nor benefitted at all.

Q12. Name the interaction that exists between sucker fish and shark.

Ans. Sucker fish and shark shows commensalism.