Phanerogamic Plant Parasites

Although most of the plant diseases are caused by fungi, bacteria, viruses and nematodes, there are a few seed plants (phanerogames) that are parasitic on living plants. In many cases, the damage caused by these parasites is only slight or the attacked host plants are of little economic importance but there are many examples where these flowering plants attack valuable crops and trees causing considerable damage. The common parasitic flowering plants can be grouped as follows:

1. **Stem Parasites:**

A. Holoparasites (entirely dependent):- Example: *Cuscuta* spp.

B. Semiparasites (partially dependent):- ex., *Loranthus* sp.

2. **Root Parasites:**

A. Holoparasites (entirely dependent):- ex., *Orobanche* sp.

B. Semiparasites (partially dependent):- ex., *Striga* sp.

***Cuscuta* (Amarbel, dodder, love-vine, Akash bhanwar):** These are non chlorophyll bearing, leafless, twining parasitic seed plants which attach their yellow, orange or pink thread like stems to the stems or other parts of the cultivated host/wild plants. Leaves of *Cuscuta* are presented by minute, functionless scales which are evident on close examination. When the stem comes in contact with the host, minute root like organs (haustoria) penetrate the host cortex reaching into the fibro vascular bundles. They serve as an anchor as well as organs of food absorption. The tiny, white, pink or yellowish flowers occur in clusters. The fruit is a capsule producing tiny gray or reddish brown slightly rough seeds. A single plant may produce as many as 3000 seeda. The seeda germinate just like the seeds of other plants. A young seedling of the parasites is slender, yellowish, unbranched thread. On a susceptible host, the stem of *Cuscuta* seedling soon produces haustoria to establish itself. Clover, Berseem, Flax (linseed) and many other oilseed crops are also attacked. The common *Cuscuta* (*C.gronovii*) attacks garden ornamentals and hedge plants. The dispersal of the parasitic takes place through the following means:

1. As impurity in the crop seed

2. As seed and stem pieces moved by irrigation water

3. As seed in the manure

4. As stem piece transported by cattle, birds, strong winds and farm implements

***Loranthus* (Banda, Dendrophthoe, giant or true leafy mistletoes):** The *Loranthus* is the partial stem parasite of common fruit and wasteland and roadside trees. Its Sanskrit name *Virkshbhaksha* (meaning eater of trees) describes the damage done by it and suggest that it was present in India in ancient times. In India, mango trees are worst sufferers from *Loranthus.* In Northern India, 60-90% of the old, local type mango trees and a large number of other trees are heavily or moderately infested by this parasite. They are the semi parasites of tree trunks and branches. Their leathery and evergreen leaves possess chlorophyll and synthesize carbohydrate constituent of their food requirement. Since the parasite attacks the aerial parts of the host trees, situated far above the soil level and since it is devoid of true root system of its own, it is dependent on the host for water and minerals nutrients. Other manufactured food from the host also passes into the parasite. It obtains these by developing haustoria which grow into the host tissues and become intimately associated with vascular elements. The continuous drain of the nutrients by the parasite deprives the host of its normal nutritional requirements and the host look as malnutritioned. Growth and development of the host is adversely affected and usually the attacked branches wither and die eventually

Dendrophthoe falcata is the common species reported in India. It is a strongly branched and glabrous shrub. The stem is thick, erect or flattened at the nodes and appears to arise in clusters at the point of attack. The clusters form a dense and bushy growth which can easily be spotted on the trees. The place at which the host is attacked and where the haustorium penetrate, often swells to form tumors which vary according to the age of the parasite. Sometimes the parasite produces a creeping branch that grows alongwith the host stem and produces haustoria at intervals. The flowers are borne clusters. They are long and tubular in shape and usually greenish white or red in colour according to the species. The dispersal of the parasite is through the birds and excreta of some other animals. Birds eat the seeds alongwith the fruit of the parasite and excrete at the branches of healthy trees. Seeds germinate there and gem tube after some growth establishes contact with the host by forming haustoria. Apart from it, birds also carry the seeds of the parasites alongwith the sticky pulp of the fruit that sticks to their bodies and feathers.

***Orobanche* sp. (Broomrape):** Broomrape (*Orobanche* sp) is a root holoparasitic plant devoid of chlorophyll and is entirely depending on the host for its nutritional requirements. It is causing considerable yield losses (5-100 %) in the crops, especially in the drier and warmer areas. It is total parasite of the roots of cultivated crops *viz.,* tobacco, brinjals, cabbage, cauliflower and many other Leguminous, Oilseeds, Solanaceous and Crucifer plants.

The parasite consists of a stout, fleshy stem, 15-50 cm tall, pale yellow or brownish red in colour, covered by small, thin and brown scaly leaves. Flowers appear in the axils of the scales and are white and tubular. Seeds are produced in ovoid pods and are very small and black. Perennation of the parasite is through the seeds which may revive for more than 10 years. They germinate only roots of the host plants exude in vicinity. Upon contact with the host roots, the radical of the germinated seed attaches to it and produces a disc or cup like appressorium surrounding the host root. After penetration, the parasite establishes its contact with the host vascular system comprising both, the xylem and the phloem. Soon the parasite starts developing stem which emerge the soil surface in large numbers. When the host is carefully uprooted, the roots of the parasite can be seen intertwining with the roots of the host. The robbery of the nutrients from the host make the host underdeveloped and weak. Due to malnutrition the affected hosts do not grow and yield according to their potential.

***Striga* (Witchweed):** Witchweed is a well known semi root parasite of sugarcane, cereals, maize and millets in India, Australia and Africa. Four species of the parasite *i.e. Striga densiflora, S. euphrasioides, S. asiatica* and *S. lutea* have so far been reported from India.

The parasite is a small plant (15-30cm long), having bright green, slightly hairy leaves and stem. Usually the plants develop in clusters around the stem host. Leaves of the parasite are long narrow and in opposite pairs. Flowers are small and are brick red or scarlet in colour. They appear just above the leaf attachment to the stem and are produced throughout the season. The fruit is a capsule and each pod contains as much as thousands of seeds that are tiny and brown in colour. Seeds are extremely light in their weight and are viable up to 40 years. Seeds do not germinate readily (in the same season) but require a minimum dormancy of 15-18 months. The host rot exudates are essential for the germination of the seeds. If germinated in the absence of the host root (by some other stimuli), the parasite dies within 3-7 days. After successful contact with host, the parasite initiates haustorial formation that reach up to the xylem bundles of the host for drawing water and minerals. It is an obligate parasite completely depending upon the host from germination to flowering and reproduction. Several hundred witchweed plants may parasitize a single host plant but only a few reach above the soil surface. Their effect on the host is the same as that of other phanerogamic plant parasites.