

FLOWERING PARASITIC PLANTS

INTRODUCTION

Characteristics of Flowering Parasitic Plants

- The pathogenic flowering plants, also called parasitic angiosperms can be classified as root parasites or stem parasites.
- Root parasites (witchweed and broomrape) are more common and more diverse taxonomically.
- Stem parasites include the dodder (*Cuscuta*) and mistletoes (*Arceuthobium*).
- The angiospermic parasites can also be classified as holoparasites (total parasites) or hemiparasites (semiparasites).
- The holoparasites lack chlorophyll and are totally dependent on the host for nutrition. Thus, they are obligate parasites.
- The hemiparasites contain chlorophyll and make their own food, and absorb water and minerals from their host. But, in some cases, e.g., *Arceuthobium*, the photosynthesis is negligible and the parasite draws nutrition from the host. Practically, it is an obligate parasite.

Important Genera

- There are 277 genera and as many as 4100 parasitic plant species; but only 25 genera are recognized as plant pathogens.
- Out of these 25 genera, four are more damaging to crops viz., *Striga* (witchweed), *Orobanche* (broomrape), *Cuscuta* (dodder) and *Arceuthobium* (dwarf mistletoe).
- *Striga* is more prevalent in Asia and Africa, while *Orobanche* is worldwide, but more damaging in the Middle East.
- Both *Striga* and *Orobanche* produce microscopic seeds called ‘dust’ seeds that persist in the soil for a long time, and are difficult to control.
- Dwarf mistletoes (*Arceuthobium* spp.) are the major pathogens of coniferous trees (belonging to families Pinaceae and Cupressaceae).
- *Dendrophthoe* (*Loranthus*) and *Viscum* species are parasitic on the forest, fruit and avenue trees; and are responsible for their die back and drying in Himachal Pradesh.

ROOT PARASITES

Striga (witchweed)

- *Striga* is an obligate root hemiparasite, although the seedlings above ground do form chlorophyll.
- *Striga* has made greater impact than any other parasitic angiosperm.
- It attacks important crops like maize, sorghum, pearl millet, rice, sugarcane and legumes (cowpea, groundnut, etc.).
- Two species, *S. asiatica* and *S. hermonthica* cause maximum damage to crops.
- *Striga* has a complex life cycle. It produces thousands of ‘dust’ seeds that are disseminated by wind and rain.
- The seeds after a dormant ‘ripening’ period of several months, respond to chemical signals exuded by the host.
- The chemical signals enable the *Striga* seeds to detect the type of host and its distance from the host.

- Seed germination of *Striga*, as in all obligate root parasites, is cryptocotylar i.e. the cotyledons remain within the seed when the radical comes out.
- The radical produces root hair like structures that glue it to the host.
- If the host is suitable, a haustorium is formed that penetrates and forms a link with the host vascular system.
- Once the parasite is established, the distinctive seedling of *Striga* is formed underground, which lacks chlorophyll, possesses scale-like leaves, and produces abundant adventitious roots that form additional haustoria, establishing more connections with the host.
- The seedlings exert great influence on the growth-regulating metabolism of the host, stimulating root production.
- Significant damage to the host occurs at this stage. The next stage is emergence of the seedlings above ground.
- Chlorophyll develops, and in due course, flower and seeds are formed. The life cycle is ready for a repeat.
- A major problem in control is persistence of the tiny seeds in the soil. Ethylene gas is introduced into the soil to induce seed germination, which becomes suicidal in absence of the host.
- Equipments and application methodologies have been developed to introduce the gas into the soil.
- Up to 90% seeds germinate by this method, and die in absence of the host.



Fig.13.1 Partial root parasite-*Striga*



Fig.13.2 Total root parasite-*Orobanche*

STEM PARASITES

Cuscuta (dodder)

- It is obligate stem holoparasite and is among the best known of all parasitic plants.
- Its slender, twining, orange-yellow, leaf less stems form conspicuous tangled mass on the host.
- The host range is large, though monocots are less preferred.
- Dodders are most important parasites of legumes.
- *Cuscuta campestris* is the most widely distributed among its 10 species that attack crops.
- It causes considerable damage to alfalfa, flax, sugarbeet, onion and other crops besides fruit, fodder and forest trees and shrubs . It also transmits viruses.
- The most effective means of control is seed sanitation. Several herbicides are effective on newly-germinated seeds.



Fig. 13.3 Dodder (*Cuscuta* sp.)



Fig. 13.4 Showy mistletoe (*Dendrophthoe*)



Fig. 13.5 Leafy mistletoe (*Viscum* sp.)

