

Plant Defenses

Plants are a source of nutrition for many other organisms - bacteria, fungi, protists, animals, and viruses

Plants are not defenseless - dermal tissues are waxy and help prevent entry of parasites, silica can be incorporated into tissues to deter grazers, irritating trichomes and thorns can also stop grazing,

Many plants produce chemicals that can deter attacks - a plant secondary compound is a chemical produced by the plant that fulfills no metabolic requirement but deters attack by other organisms. Include: alkaloids - caffeine, nicotine, cocaine
tannins
oils - peppermint, sage

Table 39.1 Secondary Metabolites


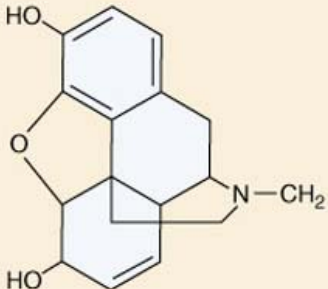

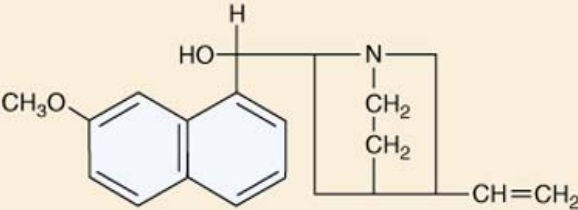

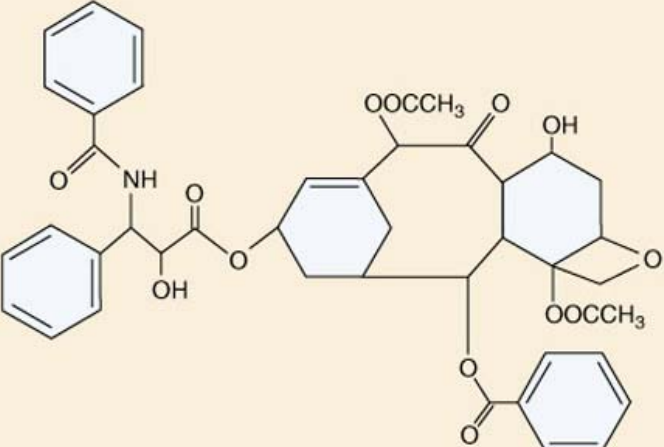

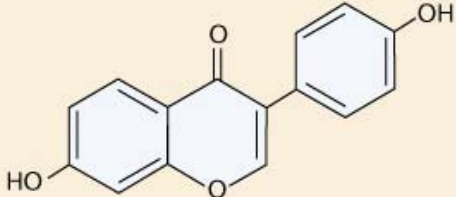

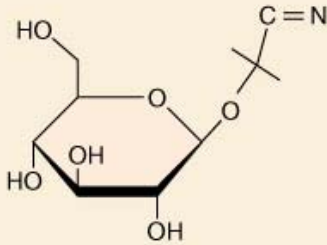
Compound	Source	Structure	Effect on humans
<p>Morphine (alkaloid)</p>	 <p>Opium poppy <i>Papaver somniferum</i></p>		<p>Narcotic pain killer</p>
<p>Quinine (alkaloid)</p>	 <p>Quinine bark <i>Cinchona officinalis</i></p>		<p>Antimalarial drug</p>
<p>Taxol (terpenoid)</p>	 <p>Pacific Yew <i>Taxus brevifolia</i></p>		<p>Anticancer drug</p>

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<p>Genistein (phytoestrogen)</p>	 <p>Soybean <i>Glycine max</i></p>	 <p>Genistein</p>	<p>Estrogen mimic</p>
<p>Manihotoxin (cyanogenic glycoside)</p>	 <p>Cassava <i>Manihot esculenta</i></p>		<p>Metabolized to release lethal cyanide</p>

Toxins are not toxic to the plant because

- sequestered in membrane-bound compartments and only released when tissue is damaged (e.g. many quinones)
- produced as a nontoxic chemical that becomes toxic when metabolized by predators (e.g. cyanogenic glycosides)

Some plants can have defenses against competition from other plants

Allelopathy occurs when a chemical signal secreted by the roots of one plant blocks germination of nearby seeds or inhibits the growth of a neighboring plant. Black walnut is allelopathic

Some plants have mutualistic interactions with animals that provide defenses for the plant

Acacia trees and ants

trees provide ants with sugar in nectaries, ants provide predator protection



Parasitoid wasps, caterpillars, and leaves

wound response releases volatile compound attracting parasitoid wasps

