

Fig. 15.50. The biosynthetic pathway for cyanogenic glycoside, prunasin.

trees are raised from seeds which are sown in nurseries and seedlings transplanted after one year. The trees are planted 6-8 m apart in circular pits. The trees tend to grow large with long branches. The fruit is borne largely on short-spurs. The almond crop comes to harvest from July to September. Almonds are graded into several classes to meet the demand for specific purposes. Unshelled almonds are stored in a cool, dry and well-ventilated place.

Characters

Almond tree is about 5 m in height. The bitter almond is 1.5-2 cm long, rounded at one end and pointed at the other. Cinnamon-brown coloured testa is present which is removed by soaking in hot water. The oil kernel consists of two large, oily planoconvex cotyledons. A small plumule and radicle are present. Some almonds possess cotyledons of unequal sizes. The presence of bitter almonds in sweet almonds can be detected by the sodium picrate test for cyanogenetic glycosides.

Chemical constituents

Bitter and sweet almonds con-

tain fixed oil (40-55%), proteins (20%), mucilage and emulsin. The bitter almonds contain a colourless, crystalline, cyanogenetic glycoside amygdalin (about 3%). In the presence of water the enzyme emulsin acts upon amygdalin and decomposes it into a volatile oil which is a mixture of benzaldehyde and hydrocyanic acid. A casein like protein, amandin, is also present in bitter almond.

It also contains prunasin, daucosterin, β-sitosterol, a biflavone, coumaric acid, Z-methylnonacosan-3-one, n-octacosanol, n-triacontane, procyanidin dimer, (+)-catechin, and (-)-epicatechin. The oil is composed of glycosides of myristic, palmitic, stearic, oleic and linoleic acids.

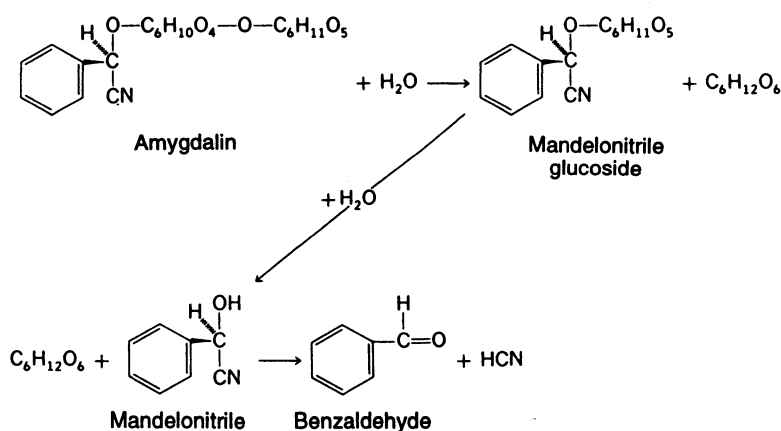


Fig. 15.51. Hydrolysis of amygdalin.

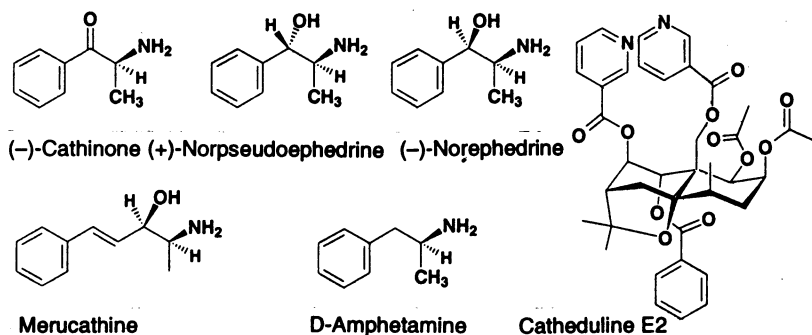


Fig. 21.84. Chemical constituents of Khat.

of small, yellow, fibrovascular bundles lies about 1 mm from the outside. Odour, slight; taste, acrid and bitter. Bloodroot contains the benzophenanthridine alkaloids sanguinarine, chelerythrine, allocryptopine, protopine and dihydrosanguilutine; red resin and starch. Sanguinarine and chelerythrine form red and yellow salts, respectively.

Bloodroot is used as an ingredient of compound White Pine Syrup in USA. Sanguinarine, like colchicine, causes the doubling of the chromosomes in cells.

COLCHICUM CORM

Synonyms

Meadow Saffron; Autumn Crocus; Wild Saffron; Meadow Crocus; European Colchicum seed; Colchicum root.

Biological source

Colchicum seed and corm are obtained from *Colchicum autumnale* Linn. Indian drug is obtained from the species *C. luteum* Baker. (Fam. Liliaceae).

Geographical source

The plant is an annual herb found in England, Poland, Czechoslovakia, Yugoslavia, U.S.A. and Holland. In India *C. luteum* is used as a substituent for *C. autumnale*.

Cultivation and collection

Fresh seeds are sown which germinate up to about 30%. In August-September 2-6 flowers bloom which are identical to Saffron and has lilac or pale

purple colour. More than half the length of the flower is below in ground. Leaves and capsular fruit are produced in the next spring. The fruit is a three lobed, three-celled and septicidal capsule. On expansion of leaves in the spring the fruit comes out the ground. It is collected in July or August before its dehiscence and kept in muslin bags. Numerous seeds are liberated on septicidal dehiscence of the fruit

into three valves. The matured seeds are dark in colour and surrounded by a sweet saccharine secretion. Before flowering corms are dug out for medicinal use, their outer membranous scales are removed, cut in transverse or longitudinal pieces and dried up to 65°C.

The corm consists of an underground stem bearing leaves and fibrous roots. In the latter part of the summer, a new corm is developed in the axil of a scale leaf near the base of the old corm. In September the parent corm bears the remains of recently withered leaves and is larger than the daughter corm. For medicinal purposes the corm should be collected shortly after the withering of the leaves (early summer) and before the enlargement of its axial bud. The corms are surrounded by a dark, membranous coat. The young corm develops fibrous roots at its base, and in August or September two to six flowers emerge from it. The flowers are 10-12 cm long. More than half the length of the flower is below ground, and the fruit lies protected throughout the winter by the surrounding corm and earth. The fruit is a three-lobed, three-celled, septicidal capsule, which is carried above ground in the spring by the expanding leaves. The daughter corm grows at the expense of the parent, which now gradually perishes. It may produce in its second spring one or more small corms.

Characters of corm

The corms, collected in July, are cut into transverse slices and dried at a temperature not exceeding 65°C. The outer membranes are rejected. The whole corms are 2-3 cm diameter. The dried drug consists

Biological source

Aconite is the dried roots of *Aconitum napellus* Linn. collected from wild or cultivated plants. (Family : Ranunculaceae).

Geographical source

The plant has been originated from the mountainous and temperate regions of Europe. It occurs in Alps and Carpathian mountains, hills of Germany and Himalayas. The greater part of the commercial drug is derived from wild plant grown in central and southern Europe, particularly Spain.

Cultivation and plant habitat

Aconite is a perennial herb with a fusiform tuberous root. The plant is propagated from the daughter tubers. An apical bud on the apex and six lateral buds on its surface are developed. A lateral shoot bearing a thin lateral root is produced from each lateral bud. The lateral roots are called daughter roots and the main root is known as parent root. The daughter root develops gradually, becomes thick in autumn and buds are produced on its apex and surface.



Fig. 21.90. *Aconitum napellus*.

Daughter roots are planted in soil containing leaf mould and some amount of lime. The roots are collected in autumn. Collection of Aconite from wild plants is done during flowering season. Roots are dried at 40-50°. Thus Aconite arises from one or more lateral shoots which develop into conical daughter tubers.

Morphology

Appearance of Aconite varies from season to season. Aconite collected in autumn is conical in shape and tapering below. Surface is slightly twisted bearing longitudinal ridges. Some Aconites may contain fibrous rootlets or their scars. On the top of parent root some remains of stem base are present which are more shrivelled. An apical bud is present at the apex. The colour is dark-brown. The root is 4-10 cm in length and 1-3 cm in diameter at the crown. Rootlets may be present. The fracture is short and starchy. The fractured surface is 5-8 angled, contains stellate cambium and a central pith. The odour is slight. Taste is sweet at first followed by tingling and numbness.

Transverse sections cut from the crown show a stellate cambium with five to eight angles. The amount of lignified tissues is small, the major part of the root consists of starch-containing parenchyma of the pith and secondary phloem.

Chemical constituents

Aconite contains aconitine (0.4- 0.8%), hyaconitine, mesaconitine, aconine, napelline (isoaconitine, pseudoaconitine), neoline, ephedrine, sparteine, picraconitine, acotinic acid, itaconic acid, succinic acid, malonic acid, fat, starch, aconosine, 14-acetylneoline, hokbusine A, senbusine A and C, mesaconitine, diterpene 15 α -hydroxyneoline and levulose (fructose). The aconitines are diacyl esters of polyhydric amino alcohols and are extremely poisonous. Atisines are also amino alcohols but have low toxicity. The basic skeleton of aconite alkaloid is consisted of a pentacyclic diterpene which is derived from phyllocladene. The toxicity of alkaloids is decreased on hydrolysis.

Uses

Aconite is cardiac effective. It is used externally as a local analgesic in liniments and to treat neuralgia,