= Tephrosia apollinea =

Tephrosia apollinea is a legume species , native to southwest Asia (the Levant , Arabia , Socotra , Iran , Pakistan , northwestern India) and northeast Africa (Egypt , Sudan , Ethiopia , Eritrea , Djibouti , Somalia) .

The leaflets of the plant are obovate @-@ oblong and equal @-@ sided , and of a silky texture . The fruits (legumes) are typically one to two inches (2 @.@ 5 to 5 @.@ 1 cm) long and contain six or seven brownish seeds . The species typically grows in areas where the soils are relatively deep , especially in semi @-@ arid and wadi areas , and on terraces and slight inclines and hills .

Tephrosia apollinea is known to be toxic to goats . Although it has been used in Oman to treat bronchitis , cough , earache , nasal congestion and wounds and bone fractures , as of 1993 its wider impact on humans had not been assessed . It can be used to make indigo dyes , and the leaves and those of other plants are used to make hot drinks by the Bedouin in parts of Sinai and the Negev .

= = Description = =

The leaflets of the plant are obovate @-@ oblong , somewhat wedge @-@ shaped , equal @-@ sided , and of a silky texture . The mid @-@ rib is usually folded longitudinally , and they are characterized by parallel transverse veins . The fruits (legumes) are typically one to two inches long (2 @.@ 5 to 5 @.@ 1 cm) and contain six or seven brownish seeds . The plant displays purple flowers during season ; they are described as their most attractive in the month of January . It typically grows to 45 ? 50 cm in height , and can grow on mountains with an altitude of over 3000 ft . (914 m) . Both diploid (22 chromosomes) and tetraploid (44 chromosomes) cytotypes have been reported .

The roots of Tephrosia apollinea are deep , penetrating soils to a depth of 3 metres or more , aiding the absorption of moisture from the soil . Moisture is stored in the cortex of the roots , which is protected by a thin periderm . Water storage in the cortex enables growth and reproduction during times of drought , which allow it to thrive in both arid and semi @-@ arid conditions and to survive during winter and summer months at times of low rainfall . The roots grow at a faster rate than the shoots themselves , and even at the early stage of the plant displaying a shoot the length of a cm , the roots may already be 30 cm or more in length .

A proposed 1993 treatment of T. apollinea as a subspecies of Tephrosia purpurea noted some regional variations , with plants in the Eastern Desert of Egypt possibly producing smaller pods , leaves , and leaflets , and plants from oases having densely pubescent spreading hairs . Among the features they described as differentiating the apollinea subspecies from the nominate purpurea subspecies were that apollinea has somewhat longer pods (3 @.@ 5 ? 5 or sometimes 5 @.@ 5 cm , rather than 3 ? 4 cm) , a wider range in the quantity of seeds per pod (generally 7 ? 9 , as low as 3 , rather than generally 5 ? 6 , or sometimes 7) , the pods being curved upwards rather than downwards , and leaflets having 9 rather than 7 lateral veins .

= = Taxonomy and names = =

The plant was initially named Galega apollinea by Alire Raffeneau Delile in 1813 , and moved to the genus Tephrosia by Johann Heinrich Friedrich Link in 1822 .

Its treatment as a subspecies of Tephrosia purpurea , called Tephrosia purpurea subsp. apollinea , was proposed by Hasnaa A. Hosni and Zeinab A. R. El @-@ Karemy in 1993 . This treatment has not been accepted by the databases The Plant List , International Legume Database & Information Service , or Tropicos . Hosni and El @-@ Karemy treated T. apollinea and T. purpurea as a single species after finding that their previous descriptions " agree in most of their characters and the distinction between typical forms is rather difficult ... " The full name with authorities under their revised classification is Tephrosia purpurea (L.) Pers. subsp. apollinea (Delile) Hosni & El @-@ Karemy .

In parts of southern Arabia the species carries the vernacular name of hailara , and it is also known

as dhafra , dhawasi , omayye or nafal to Arabs , and written as ???? in the Arabic language . In the Sinai area of Egypt it is referred to by the Bedouin as sanna or senna . It is also known as amioka in parts of Sudan . Due to its traditional use in making indigo dyes , Tephrosia apollinea has also been referred to as " Egyptian indigo " .

= = Distribution and ecology = =

The species is recorded in the northeast African nations of Djibouti , Egypt , Eritrea , Ethiopia , Somalia , and Sudan , the Western Asian nations of Iran , Israel , Jordan , Oman , Saudi Arabia , South Yemen , the United Arab Emirates , and Yemen (including the Yemeni island of Socotra) , and the South Asian nations of India and Pakistan . Within India , it is documented in the western states of Gujarat , Maharashtra , and Rajasthan .

The species , cited as a " leguminous desert forb " , typically grows in areas where the soils are relatively deep , especially in semi @-@ arid and wadi areas , and on terraces and slight inclines and hills . In Saudi Arabia it has been found scattered among species such as Zilla spinosa , Rhanterium epapposum , Astragalus spinosus , Gymnocarpos decandrum , Achillea fragrantissima and Halothamnus bottae on the edges of the slopes of desiccated lakes .

It has been well documented in sources in Egypt and Sudan . In 1866 the Pharmaceutical Journal stated that it was found as a contaminant in Alexandrian senna , being found in cultivated fields in the valleys to the east and south of Assouan , in the Elephantine Islands , opposite Assouan , along the Nile , and Edfou and Hermonthis . In Israel it grows in the Judean desert , the Dead Sea Valley , the Negev hills and Eilat .

In wadi areas of the Yemen it tends to grow on desert alluvial shrubland , and coexist with Fagonia indica , Cymbopogon schoenanthus and Boerhavia elegans . An example of Tephrosia apollinea was found by Harry St John Bridger Philby in 1936 at Raiyan , about 150 miles (240 km) northeast of Sana 'a . In Socotra , an island off the coast of Yemen , it is typically found in the Croton shrubland of lowland plains at altitudes of between sea level and 100 metres on overgrazed soils , along with Cassia holsericea . In a 2000s analysis of vegetation in the woodlands of northern Socotra , the species was found to coexist with Achyranthus aspera , Ageratum conyzoides , Bidens chinensis , Forsskaolea viridis , Hibiscus vitifolius , Indigofera coerulea , Leucas urticifolia , Setaria adhaerens and Solanum incanum .

Tephrosia apollinea is also found in the United Arab Emirates and in Oman , where it inhabits the Jiddat al @-@ Harasis desert and dominates the beds of wadis in mountains such as Jebel Shams .

= = Toxicity = =

Tephrosia apollinea is cited as " unpalatable " , although the seeds of the plant are reportedly a favourite of sandgrouse inhabiting the scrub @-@ desert of northern Sudan , and the butterfly Colias croceus is known to feed on it . This has allowed it to colonize the landscape in parts of the Middle East which have been overgrazed , especially at lower altitudes .

The species is known to be toxic to goats ; a study published in the early 1980s revealed that 11 out of 12 goats died after 1 to 40 days of daily oral dosing of Tephrosia apollinea shoots (fresh or dried) , and that they displayed adverse reactions to ingesting it such as dyspnoea , weakness of the limbs and joints causing instability in movement , changes in fat composition , catarrhal enteritis , and hemorrhage in the heart , lungs , and intestinal mucosa . Rotenoids extracted from the seeds of the plant also caused complete mortality in Aphis craccivora , when applied at a concentration of 0 @.@ 1 % for 48 hours .

= = Uses = =

Tephrosia apollinea can be used to make indigo dyes . The species was noted to be commonly cultivated for this purpose in Nubia in the 1800s .

The plant is known for its medicinal properties and has significant anti @-@ bacterial properties ; the leaves and the root have been used to treat bronchitis , cough , earache , wounds and bone fractures by herbalists in countries like Oman . The ground leaves of Tephrosia apollinea are also inhaled to reduce nasal congestion , or boiled with water to make eardrops . Powdered bark can be mixed with water and poured into the ears of camels to alleviate ticks , and powdered leaves can be used as a paste in the treating of wounds . It can also be rubbed on limbs in conjunction with Fagonia indica and Ocomim basilicum to treat people affected with polio .

Although unpalatable when consumed raw , when boiled the leaves of Tephrosia apollinea and numerous other plants are used to make hot drinks by the Bedouin in parts of Sinai and the Negev . But herbal doctors in Oman warn that Tephrosia apollinea can be potentially harmful to humans , and as of 1993 it had not been fully analyzed chemically to assess the wider impact it could have on health .

= = Phytochemistry = =

When dried , the leaves of Tephrosia apollinea were found to contain 4 @.@ 4 % moisture , 21 @.@ 1 % of crude protein , 19 @.@ 8 % of crude fiber , and 10 @.@ 9 % of ash . A chemical analysis found that it contains rotenoids , isolflavones , flavanones , chalcones , and flavones , The chloroform extract of the aerial part of Tephrosia apollinea also revealed seven new 8 @-@ prenylated flavonoids , including tephroapollin A @-@ G (1 @-@ 7) .

In 2006 , researchers of Oman 's Sultan Qaboos University published their findings from a chemical investigation into the leaves in which they found it contained semiglabrin , semigalbrinol , and a new flavanone named apollineanin . One 2014 study revealed that pseudosemiglabrin extracted from the aerial parts of Tephrosia apollinea had an antiproliferative effect on cancer cell lines .