Robinia pseudoacacia

L.

Fabaceae - Papilionoideae

robinia

LOCAL NAMES
Dutch (robinia,valse acacia,schotdoorn); English (acacia locust,black locust,Chinese scholar tree,false acacia,honey locust,robinia,yellow locust,white acacia,white locust,locust tree); French (acacia blanc,robinier faux-acacia,acacia des jardiniers); Hindi (kikar,robinia kikar); Italian (robinia,falsa acacia); Trade name (robinia)

BOTANIC DESCRIPTION
Robinia pseudoacacia is a medium-size tree, 25 m tall, 60 cm dbh; trunk irregular; crown open, irregular; branches short, brittle; the persistent stout spines on young shoots are found on mature wood; the smooth bark becomes reddish-brown and deeply furrowed with age.

Leaves are deciduous, alternate, pinnately compound, composed of 7-19 leaflets (terminal leaflets present) on a central stalk 20-30 cm long; 2 spines (modified stipules) at the base of each leaf; leaflets oval, 30-50 mm long, dull green, bristle tipped, smooth margined.

Flowers showy, white, pealike, fragrant, in loose, drooping clusters, about 14 cm long, arising from leaf axils near the tip of a new shoot.

Fruits are pods, 7-10 cm long, flat; husk thin walled, smooth, dark to reddish-brown, several on a central stalk, remain on the tree during winter; seeds dark, beanlike, 3-5 mm long, 5-8 per pod, with a hard impermeable coat.

The genus was named after Jean Robin (1550-1629) and his son Vespasien Robin (1579-1662), herbalists to Henri IV of France, who 1st cultivated R. pseudoacacia in Europe. The specific name is derived from Greek ‘pseudes’ (false), and ‘acacia’; the tree looks like an acacia though it is not one. The name ‘locust’ was given by early missionaries who fancied that the tree was the one that supported St John in the wilderness. It is, however, an American tree, which is not native to any other part of the world.

BIOLOGY
The pealike, bisexual flowers, borne in long dense racemes, are cross-pollinated by insects, such as honeybees, which frequently collect the nectar. Pollen is shed in the bud but is prevented from falling on the stigma by a ring of erect hairs. When an insect depresses the keel (and wing petals) of a flower, the style protrudes and the stigma contacts the insect’s body and pollen carried from another flower. The insect then touches the erect hairs and thus picks the pollen from this flower. Seed crops occur every 1-2 years, beginning at age 3, with an abundant crop every 2 or 3 years. Although it can occur as a polyploid, it is primarily diploid. (n = 10).

R. pseudoacacia is naturalized in many parts of south-central Europe. Tree in full flower in Provence, southern France. (Colin E. Hughes)

Ripe pods of R. pseudoacacia. (Colin E. Hughes)

Leaves and flowers (Arnoldo Mondadori Editore SpA)

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ECOLOGY
Apart from its cold tolerance, in ecology R. pseudoacacia resembles many other fast-growing, secondary forest legumes. However, it grows well on poor sites as acidic as pH 4.8. Although native to regions of 1000 mm annual rainfall, it survives on as little rain as 400 mm and withstands long dry periods. The trees are pioneers on disturbed soils or burned sites. It dominates early forest regeneration in many native forest stands. The tree does not tolerate waterlogging or shade.

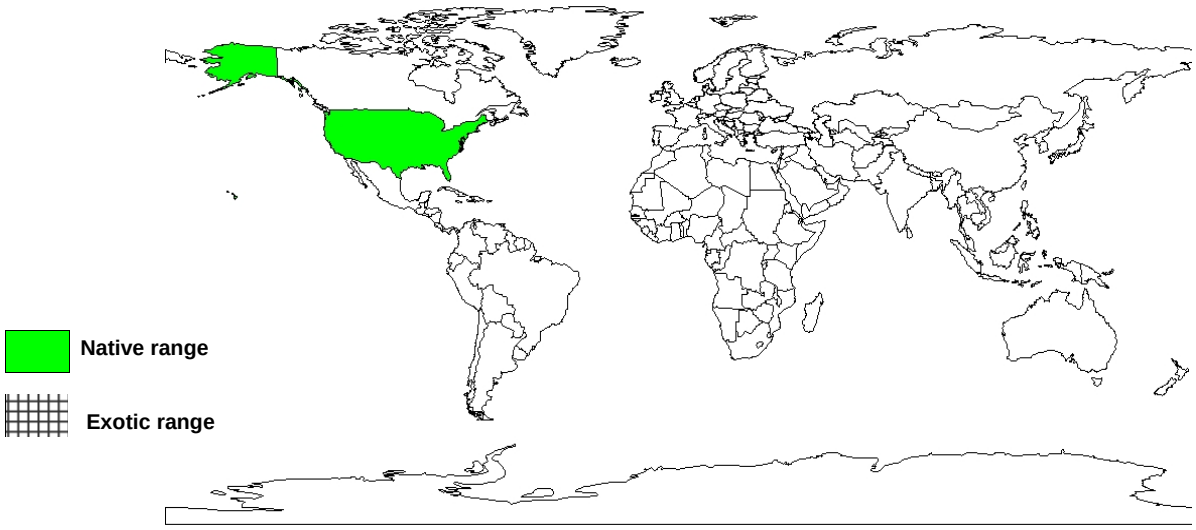
BIOPHYSICAL LIMITS
Altitude: over 800 m, Mean annual temperature: -35 to 40 deg. C, Mean annual rainfall: 1 000-1 500 mm

Soil type: Found on a wide range of soils but does well on calcareous, well-drained loams with pH range of 4.6-8.2.

DOCUMENTED SPECIES DISTRIBUTION

Native: US

Exotic: Albania, Bhutan, Bosnia and Herzegowina, Bulgaria, Byelarus, China, Croatia, Czech Republic, Czechoslovakia (Former), Democratic People's Republic of Korea, Hungary, India, Korea, Republic of, Latvia, Lithuania, Namibia, Nepal, New Zealand, Poland, Romania, Ukraine, Union of Soviet Socialist Republics (Former), United Kingdom, Yugoslavia (Former)



The map above shows countries where the species has been planted. It does neither suggest that the species can be planted in every ecological zone within that country, nor that the species can not be planted in other countries than those depicted. Since some tree species are invasive, you need to follow biosafety procedures that apply to your planting site.

PRODUCTS
Fodder: The species is lopped heavily for fodder. Mature leaves average 20-25% crude protein, 12% fibre and 45-50% nitrogen-free extracts; variation in these values is high. Tannin levels are high in young leaves but decrease with maturity. Despite the presence of toxins in the leaves, the fodder is considered highly attractive to many animals.

Apiculture: R. pseudoacacia honey is regarded as one of the world's finest. The slowly granulating honey is water-white, heavy bodied, fine flavoured with high fructose and low enzyme content. Tree improvement for late flowering and nectar sugar content is going on in Hungary and America.

Fuel: R. pseudoacacia wood burns hot and slowly, like coal, and makes good charcoal. Wood energy yield is typical of temperate broadleaf trees, about 19.44 kJ/kg. Fuelwood plantations in South Korea coppice readily and may even be lopped annually, yielding 10-20 t/ha of fuel. In Hungary, R. pseudoacacia is often grown on small private farms for wood.

Fibre: R. pseudoacacia is a preferred wood for pulp production.

Timber: R. pseudoacacia is high in specific gravity (0.8) and variable in colour, but it darkens to an attractive golden brown. The wood's hardness makes it difficult to work, but it has been widely used for fence posts, household furniture, wooden pins, wagon-wheel hubs, panelling, siding flooring, boat building, decking, vineyard or nursery props, fruit boxes and pallets. High levels of the alkaloid taxifloin make the wood very resistant to rot.

Poison: Early studies revealed toxins called robin and robinit in the bark, leaves and flowers that are believed to be associated with animal poisoning.

SERVICES
Reclamation: Rapid growth, dense wood and nitrogen-fixing ability make it ideal for colonizing degraded sites. The tree is used extensively to rehabilitate surface mine tailings and to stabilize road banks and mine spoils.

Nitrogen fixing: This tree could be called 'the grandfather' of nitrogen-fixing trees. In the 1890s, R. pseudoacacia was the 1st tree to reveal nodules and symbiotic nitrogen fixation.

Soil improver: Nutrients such as calcium, magnesium and phosphorus are available through leaf litter fall.

Ornamental: Being a Papilionoideae legume with white butterfly flowers, R. pseudoacacia can serve well as an ornamental tree around homesteads.

Boundary or barrier or support: A dense growth habit makes R. pseudoacacia suitable for windbreaks. It is grown in the Appalachians particularly for fence posts.

Intercropping: R. pseudoacacia may prove useful for alley cropping in temperate climates. Researchers at the Rodale Research Center in Pennsylvania, USA, are experimenting with intercropping R. pseudoacacia with vegetables. Numerous reports indicate the beneficial effect of this nitrogen-fixing tree to associated plants through improved soil fertility. Mixed plantings of black locust and conifers, however, can lead to reduced growth or death of the slower growing conifers because of shading and overtopping.

TREE MANAGEMENT
Since its Rhizobium is very specific and growth can be completely stunted by the absence of nodulation, a new introduction of R. pseudoacacia must be accompanied by Rhizobia. It coppices readily and may even be lopped annually.

GERMPLASM MANAGEMENT
Seed storage behaviour is orthodox; seeds are safely dried to 4% mc, and a few seeds germinate after 50 years of storage at room temperature; viability is maintained for 10 years or more in air-dry storage at 0-5 deg. C; dry seeds survive overnight in liquid nitrogen. There are about 50 000 seeds/kg.

PESTS AND DISEASES
Several borer and miner insects attack R. pseudoacacia trees and reduce their timber value but appear to have little effect on yield. The most serious pest in the USA is the locust borer (Megacyllene robiniae). There is evidence of genetic resistance to the borer. Another insect confined to the trees in the USA is the locust twig borer (Ecdytolopha insiticiana). Aphids, nectria cankers, leaf miners and rimosus heart rot also affect the tree. More work is needed on toxic components of R. pseudoacacia foliage.

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SUGGESTED CITATION

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