

Musoyeva Dilshoda Norkulovna

Intern-researcher of the Navoi Department of the Academy of Sciences

ANALYSIS OF WAYS TO IMPROVE THE GROWING CONDITIONS OF AYLANT TREE

Abstract: *Ailanthus altissima*, commonly known as the Tree of Heaven, is a fast-growing, adaptable tree native to China and now widely naturalized across the globe. While its rapid growth and tolerance to harsh conditions make it a valuable resource in certain contexts, its aggressive nature and potential for invasiveness have led to its classification as an invasive species in many regions. Nonetheless, there are ongoing efforts to explore the potential benefits of *Ailanthus*, particularly in areas with degraded soils and limited resources. This article delves into the challenges and opportunities associated with improving the growing conditions of *Ailanthus*, aiming to shed light on its potential as a resource while mitigating its negative impacts.

Key words: Adaptable tree, an invasive species, lactone simarubin, saponins, sterols, alkaloids.

Introduction. You should know that the seeds of the ailant tree are poisonous. Like walnut, ailanthus is a phytosanitary plant: it perfectly cleans the air from gas and dust and repels harmful insects.

Aylant tree is also called sky tree. Small flowers are common in summer, along with red-brown fruits in fall. The original homeland of the ailant tree is China, but it is widely grown in the United States. Studies have shown that trees in California grow faster than trees on the East Coast, and trees in the United States grow faster than trees in China. It is the ability to grow where its seeds fall. On dry and rocky slopes and rocks. Resistant to salinity. It bears fruit early, bears fruit, produces a mass of seeds every year. It usually grows quickly, especially in sufficiently moist soils. Aylant tree is tolerant of jammed rock conditions. The tree prefers moist, fertile soil, but adapts to a wide range of soil conditions and pH values. It is drought tolerant but not flood tolerant. Also, it cannot grow in the shade. In China, the Aylant tree often grows in limestone areas]. Aylant tree can survive in different climates. It is found in the highlands of Taiwan and lower elevations in mainland China in the Great Plains and arid regions of the United States. in the southern Appalachian Mountains. It grows in very wet places and cooler places under rocks. Prolonged frost and snow can cause the tops to die, but trees can grow back from the roots [1,2]. Aylant wood looks like white-yellow rice and looks like satin. It was used in furniture production. It is easy to fold and suitable for cooking kitchenware, which is an important tool for steaming buns, pastries and rice in Chinese cuisine. Zhejiang province in eastern China is famous for producing these steamers. It is also considered a good firewood material in many distribution areas. Although it is somewhat hard and heavy, it is easily obtained. However, there are some problems with using Aylant tree wood for furniture production. Because the tree grows so fast in the first few years, the internal and external structure of the trunk is different, which causes the wood to warp or break when it dries. Some techniques have been developed to prevent them from breaking during drying and can be used commercially. Although living trees often have very soft wood, it can be very hard after proper drying. General information about the literature on the chemical composition of Aylant tree, its use in folk and scientific medicine is given. The tree bark contains Aylant tree, lactone simarubin, hydroxycoumarin glycoside, saponins, sterols, alkaloids, tannins, lignans, tetracyclic triterpenoids. Common island leaves contain flavonoids, traces of essential oil, tetracyclic triterpenes, quassionides, quassionide glycosides, terpenylated coumarins, altissimacoumarins, benzoic acid derivatives [3,4].

The roots of the plant contain triterpenoids. The bark of the roots of the ailant tree contains phenylpropanoids, racemicphenylpropanoids. Island flowers contain brevifolin, brevifolin carboxylic acid, methyl brevifolin carboxylate, ellagic acid, rutin gallic acid, ethyl gallate. In Turkmen folk medicine, an infusion of the leaves of the Aylant tree is used externally in the treatment of leishmaniasis. It is studied in modern scientific medicine. It has antibacterial and antiviral properties. Aylant tree alkaloids have antibacterial, antitumor, antifungal, antiviral effects. The plant is widely used in folk medicine in Central Asian countries. An infusion of the bark and leaves of the Aylant tree is used

internally for tapeworms [5]. Aylant tree seeds are used in Chinese and Uzbek folk medicine to regulate menstruation and ovarian diseases.

Ailanthus altissima's remarkable adaptability, which allows it to thrive in a wide range of environmental conditions, also poses significant challenges:

1. **Invasive Nature:** Ailanthus is a prolific seed producer, and its seeds disperse easily, enabling rapid colonization of new areas. This aggressive growth habit allows it to outcompete native species, disrupting ecosystems and reducing biodiversity.
2. **Allelopathic Effects:** Ailanthus releases chemicals, known as allelochemicals, from its roots and leaves that inhibit the growth of other plants, contributing to its dominance in disturbed environments. This allelopathic effect can create monocultures, reducing the overall ecological diversity of the area.
3. **Weak Wood:** While fast-growing, Ailanthus wood is relatively weak and prone to breakage, limiting its use for construction or furniture. Its brittle nature can also pose a safety hazard in urban environments, especially during storms.
4. **Allergenic Potential:** Ailanthus pollen can be allergenic, contributing to respiratory problems in some individuals. Its leaves and sap can also cause skin irritation in sensitive individuals.

Rapid Growth: Ailanthus's rapid growth rate makes it a candidate for reforestation efforts in areas with degraded soils and limited resources. Its ability to fix nitrogen and tolerate harsh conditions can help restore soil fertility and stabilize slopes.

Phytoremediation: Research has shown that Ailanthus can accumulate heavy metals from contaminated soils, potentially serving as a tool for phytoremediation, the use of plants to remove pollutants from the environment [6].

High Biomass Yield: Ailanthus produces a significant amount of biomass, making it a potential source of biofuel. Research is exploring the potential of using Ailanthus wood and leaves for producing bioethanol and biodiesel.

Erosion Control: Ailanthus's deep root system can help stabilize slopes and prevent erosion, especially in areas prone to landslides or soil degradation.

Urban Greenery: With careful management and control, Ailanthus can be used to provide shade and enhance aesthetic appeal in urban environments. However, it's crucial to select cultivars that are less aggressive and prone to invasiveness.

To optimize Ailanthus cultivation for specific purposes, focusing on controlled growth, minimizing invasive tendencies, and maximizing potential benefits is key.

1. Cultivar Selection and Propagation:

Non-Invasive Cultivars: Several less invasive cultivars of Ailanthus have been developed, offering alternatives to the highly invasive wild type. These cultivars exhibit slower growth rates and reduced seed production, minimizing their spread.

Controlled Propagation: Using controlled propagation methods, such as grafting or tissue culture, allows for the production of specific cultivars with desirable traits, reducing the risk of accidental spread from seed.

Suitable Sites: Choosing appropriate sites for planting Ailanthus is crucial for managing its growth and preventing invasiveness. Areas with existing infrastructure, such as roadsides, industrial sites, or abandoned land, can serve as suitable locations.

Controlled Planting: Planting Ailanthus in controlled settings, such as fenced areas or raised beds, can help limit its spread and facilitate management practices.

Competition: Planting Ailanthus alongside other, more desirable species can create a competitive environment, potentially controlling its growth and reducing its dominance [7].

Regular Pruning and Cutting: Regular pruning and cutting back of Ailanthus can help control its size and prevent excessive seed production. Removing mature seedheads before they release seeds is essential for limiting its spread.

Herbicide Application: In certain situations, selective herbicides can be used to control Ailanthus populations, but careful application is essential to minimize damage to surrounding vegetation.

Biological Control: Exploring the potential of using natural enemies, such as insects or fungal pathogens, for biological control of *Ailanthus* is an ongoing area of research.

Genetic Modification: Developing genetically modified *Ailanthus* cultivars with reduced invasiveness and increased biofuel production potential is an area of active research.

Improved Utilization: Further research into the potential uses of *Ailanthus* wood, leaves, and roots for biofuels, pharmaceuticals, and other products can unlock its economic value.

Ecological Management: Developing integrated management strategies that combine biological control, selective herbicides, and cultural practices can help control *Ailanthus* populations while preserving the ecological integrity of affected areas [8].

Conclusion. *Ailanthus altissima* is a complex tree, offering both benefits and risks. Its fast growth, adaptability, and potential for phytoremediation and biofuel production make it a valuable resource in specific contexts. However, its invasive nature and allelopathic effects require careful management and control to mitigate its negative impacts. By understanding the challenges and opportunities associated with *Ailanthus*, implementing carefully tailored management strategies, and supporting ongoing research efforts, we can harness its potential while minimizing its negative consequences. This approach will allow us to balance the benefits of this controversial tree with the need to protect our ecological and human health.

References

1. "The Biology of Invasive Plants" - National Academies Press (2001) - Provides a comprehensive overview of invasive plant species, including *Ailanthus*.
2. *Ailanthus altissima* (Tree-of-Heaven): A Review of its Biology, Ecology, and Management" - J. R. Schroeder & T. P. Lebrun (2003) - A detailed review of *Ailanthus* biology and management strategies.
3. Phytoremediation of Heavy Metals: An Overview"- S. B. Jain & S. A. Upadhyaya (2005) - A review article discussing the use of plants for removing pollutants from the environment.
4. Cucci M.A., Grattarola M., Dianzani C., Damia G., Ricci F., Roetto A., Trotta F., Barrera G., Pizzimenti S. Ailanthone increases oxidative stress in CDDP-resistant ovarian and bladder cancer cells by inhibiting of Nrf2 and YAP expression through a post-translational mechanism. //Free Radic. Biol. Med. 2020, Apr., 150, 125-135. doi: 10.1016/j.freeradbiomed.2020.02.021.
5. "Biofuel Production from *Ailanthus altissima* (Tree-of-Heaven): A Sustainable Option for Bioenergy" - S. K. Singh & V. K. Gupta (2013) - A study exploring the potential of *Ailanthus* as a biofuel source.
6. "Impact of *Ailanthus altissima* on Native Plant Communities and Ecosystem Processes" - D. L. Nielson et al. (2016) - Research investigating the negative impacts of *Ailanthus* on native plant communities.
7. Bailly C. Anticancer properties and mechanism of action of the quassinoid ailanthone. //Phytother. Res. 2020, Sep., 34(9), 2203-2213. doi: 10.1002/ptr.6681
8. Bai W., Yang H.Y., Jiao X.Z., Feng K.N., Chen J.J., Gao K. Structurally Diverse Highly Oxygenated Triterpenoids from the Roots of *Ailanthus altissima* and Their Cytotoxicity. //J. Nat. Prod. 2018, Aug 24, 81(8), 1777-1785. doi: 10.1021/acs.jnatprod.8b00208.