International Journal of Progressive Sciences and Technologies (IJPSAT)
ISSN: 2509-0119.

http://ijpsat.ijsht-journals.org
Vol. 30 No. 2 January 2022, pp. 509-513

Regarding The Anatomical Structure Of The Stem Of Saponin Plant Species Living In Different Environments

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Abstract – The article analyzes comparative studies of the anatomical structure of annual and perennial stems of endemic, saponin plants (A. tenuifolium, A. rungens and A. albidum) growing in different environments. In the selected plant species, it was confirmed that the hilly groups are primary and the mountain groups are secondary in the atomic structure features of the stem according to the environmental conditions. This view is supported by the appearance and proliferation of internal and concentric conductive bonds in the stems of mountain plants, which are secondary to hilly groups as they age, i.e., the earlier formation of polycambiality.

Keywords – Species, Genus, Anatomical-Morphological Sign, Saponin, Epidermis, Phloem, Xylem, Lub Fiber, Parenchymal Cells, Pus.

Among the natural plants of the Republic of Uzbekistan and other neighboring republics, thorny species are of great interest among botanists and pharmacologists, as saponins (glycosides) derived from these plants are used in textiles, perfumery, confectionery, pharmaceutical, non-ferrous metallurgy and widely used in other sectors of the economy.

The demand for saponins is met by using the natural resources of these plants. However, as a result of many years of irrational exploitation, grazing, hill reclamation, and other human activities, the natural resources of many species with high saponins are now depleted. As a result, industrial reserves have been lost. Therefore, a comprehensive study of saponin plants in order to increase saponin raw materials, to determine their habitats and reserves is one of the current problems of botany, because in addition to the production of endless raw materials in the primary genetic centers of these species, human impact on the environment indirectly affects. As a result, the structure of some species or groups of species changes, and a valuable genetic source may be lost.

Our main research material is the species of A. albidum distributed in different conditions of the Fergana Valley and its range, due to the separation of this species from A.pungens by Shishkin (1936) and very close to the species A.tenuifolium A. Albidum. (Vvedensky, 1955), (although studied by other anatomical morphologists), we preferred a comparative study of these two species with A. albidum.

A. pungens was written in 1829 by Bunge under the name Saponaria pungens. In 1831, S.A. Meyer named it Acanthophyllum spinosum, Boissier - A. pungens.

Since our main research object is A. albidum, A. pungens, and A. tenuifolium, we will focus more on these species when we present the literature.

The species A. albidum was described in 1936 by B.K.Shishkin, based on the form of the polymorphic species A. pungens in the Kochkarchi hill of the Fergana Valley, the author notes that the range of the species is limited by this point. A.I. Vvedensky (1955), a botanist with a thorough knowledge of the flora of Central Asia, considers A. albidum and A. pungens to be one species - A. albidum, and writes that this species is widespread throughout Central Asia.

O.N.Bonderenko (1971) is the opposite-A. does not recognize the independence of the albidum species and considers it a synonym for A. pungens.

The scientific literature contains relatively sufficient information on the anatomical and morphological structure of leaves, flower parts, stems, roots of species Acanthophyllum, Gipsophyla, Kughitangia, Drupis (Bykova, Tursunov, 1982; Musayeva, Zakirov, 1987; Madumarov, Dariyev, 1987; Tursunov, 1988; Madumarov, SHmidt, 1988; Madumarov, Dariyev, 1991; Madumarov, 2005;). However, little is known about the development of the anatomical structure of these taxa in ontogeny.

Therefore, we aim to make an anatomical comparative study of the stems of these species in terms of their adaptation to the environment in ontagenesis.

The structure of the cross-section of the annual stem of A. pungens was studied by M.Musayeva and K.Zakirov (1987), T.A.Madumarov (2005). According to them, in the conditions of the Tashkent Experimental Site (TSU) of the Institute of Botany of the Academy of Sciences of the Republic of Uzbekistan, A. pungens type formed an internal cambium in the perimedullary zone of the stem in the second and subsequent growing years. its phloem is inward and its xylem is outward - side by side with the first year xylem. This inner conductive ligament fills the nucleus, and the nucleus cells are crushed to form a thin slit. TA Madumarov (2005) studied the plant stem of this species from Karakum and noted that neither its annual nor perennial internal cambium is formed.

The stem of A. tenuifolium is covered with single, sometimes two-celled conical simple hairs. Papillae are also common. The outer walls of the annual stem epidermis are made up of very thick cells. Perivascular fibers are 8-12 rows, lub fibers are not formed, 2-4 rows are formed. Perivascular fibers continue to break down and form bubbles.

At the base of the second year, the first year a layer of perivascular fibers was preserved. However, on one side of the two arched xylem ligaments, there is a 1–5-row arched lub fiber band. The perivascular fibers have stopped growing. The 1-year xylem of the plant stem obtained from the South of the area is composed of 2 arched rings, while the xylem of the second year consists of 3-4 small arched collateral ligaments. An internal phloem is formed in the perimedullary zone. In the third year, the inner cambium of these plants begins to produce 1-2 xylem elements. The outer perivascular fibers are eroded. Some foam is preserved. Lub fibers form a ring, but they also begin to foam, and the walls of lub fibers are thin, but not yet foamy. The 3-year xylem consists of 5 ligaments (2 on one side and 3 on the other side) with libriform collenchymatosis, parenchymal cells formed between the newly formed lub fiber and the phloem. The phloem, which was formed in the last year, was eroded and turned into a pukak.

At the base of the fourth year, the xylem ring of the first year, 3-4 xylem bundles of the 2nd year, 5 xylem bundles of the 3rd year, and the internal phloem are preserved, but the 4-year xylem ring is numerous (25-. 30) consists of collateral ligaments of different sizes, 3 loops of lub fibers in some parts completely foamed, in some places preserved in the form of an arc-shaped band.

In the cross section of the fifth year stem, collateral ligaments were formed on 13 to 26 May outside the phloem. Near the center there is a rectangular concentric band, and next to it is another small concentric band. Decomposition has begun in the large concentric conductor, but has not yet begun in the small one. Inside, an internal xylem has formed, but it is not yet divided into annual growths.

Most sixth-year collateral ligaments are composed of xylem. Outside the old phloem, 22-26 collateral ligaments are formed. Large concentric junctions have formed near the center. The internal conductive links are also divided into several separate links. Outside the cambium, an old phloem is located along the ring. However, in the North-East-derived plant stem of the area, the double-arched structure of the annual growth of xylem is maintained for up to 4 years. In later years, arches that survived up to 4 years were divided into 2-3 radial arches, but in most cases the arc fragments were kept very close together.

T.A. According to Madumarov (2004) and the picture of the cross-section of the perennial stem, the biennial xylem of the plant A.pungens from Karakum consists of 4 arches on each side, 4-5 in 6-7 years. and the xylem of subsequent years composed of 4 very large radially located collateral ligaments from a large number of radial long inverted conical ligaments at the expense of the radial division of the previous 4 ligaments and the newly formed conductive ligaments. forms a conductive system consisting of This structure of the stem is classified as A.pungens.

However, the cross-sectional structure of the biennial plant stem distributed in the Kyzylkum is similar to that of all plant forms studied by other researchers outside the stem phloem, i.e., between the phloem and the perivascular fiber, the arcuate fine-celled mechanical tissue bond, 3- It differs from other populations by the formation of an internal cambium in the perimedullary zone of the 4-year-old stem and the formation of two internal xylem ligaments within 3 years (the phloem remains as it was in the first year). On top of that, 3-4 year old xylem arches are divided into 2 to 4 groups on each side. Their separation takes place using the xylem parenchyma. At 8–10-year-old stems, the xylem divides into 10–14 radial inverted conical collateral ligaments, and 6–8 internal small procambial xylem ligaments are also formed. At the base of the Qoratau form, the annual growth of the xylem in 4–5 years remains 1 to 2 arches on the 2nd side, from 5–6th year it is divided into radial ligaments, the inner cambium is formed and two phloem ligaments on each side inwards. It forms 2 xylem bonds, one on the outside and 2 on the outside (sometimes it works for one or two years). In later years, its structure is similar to that of the perennial stem of the Kyzylkum form.

From the above data, it can be seen that the anatomical structure of the stem of A. pungens type varies depending on the geographical points of distribution, ie it is anatomically polymorphic. If the xylem is an annual growth arc fragmentation (separation into radial ligaments), the formation of an internal cambium - internal conductive ligaments formed in the perimedullary (core) zone and collateral ligaments on the outside of the old phloem If we do not take into account the time of formation, then “A. The structure of the perennial stems of all populations of the genus "pungens" is described by TA Madumarov (2004) However, based on these characteristics, the structure types of the stem of A. pungens type may vary depending on the location or population of the plant, so only the core of the typical xylem can be used to classify the stem structure into types. given the structure of the wood fraction between and phloem up to the time of disintegration, the structure of the stem xylem in each population is limited to one or 2 types.

The analysis of the results of the study of the cross-sectional structure of the stem of plant groups obtained from points of the A. albidum area, an endemic species of the Fergana Valley, with different environmental conditions, leads to the following conclusion.

All groups of A. albidum plants in the foothills of the Fergana Valley and the annual stem xylem and primary phloem of A. tenuifolium (Mayli-say) are characterized by a ring structure, and the secondary (young) phloem is connected by a structure. The stem xylem of the Chimyon-Mindon and CHust-Pop groups (3) -4-5 years has an annual growth of 2 arches, the relative similarity of the external environment at these points of the species range and the interaction of plant groups proof of kinship. In Chust and Pop plants, the 2-arched xylem splits in (3) -4 years, the 3-year xylem arc splits into 2-3 bonds in some plants, and many in the next 4-5-6 years. the division into links and the sympathetic nature of their habitats indicate that they are very closely related to each other and, therefore, belong to a single - Chimyon - Mindon group. The xylem of the Chimgan and Mindon plant groups preserves the 2-arc structure of annual growth up to 4-5 years and the proximity of their habitats confirms that they are closely related to each other and belong to the same group as the Mindon-Chimyon group.

The structure of the typical (between the stem and phloem) xylem in the perennial stem of these groups is T.A. Madumarov's 2nd type "A.cirtostegium" belongs to CHust, and the pop group belongs to the author's sixth type - A.pungens. At the base of the Suluk-ota and Khurjun Mountain groups, the typical 2-arched xylem splits in 2-3 years, and in the same year the inner cambium is formed, and in subsequent years their number increases. indicates that the structure of the annual stem xylem belongs to type 5 "A.tenuifolium"; the large number of concentric bonds is evidence that environmental factors at these points in the range are significantly different from the habitats of other groups.

Based on the distribution points (points) of the Mindon-Chimyon and Khurjun mountain groups throughout the range, it can be said that the Khurjun mountain group originated from the plants of the Mindon-Chimyon group. This is due to the fact that the stem epidermis of this group is thickly covered with 1-2-celled conical hairs, the bark parenchyma is 3-4 rows, and in the group of Mount Khurjun it is reduced to -2 rows; preservation of the epidermis and cortical parenchyma in some places at the base of the second year; xylem begins to divide into collateral ligaments in 5-6 years, and in Khurjun mountain plants the acceleration of this process begins in 2-3 years of vegetation, and in subsequent years in Khurjun mountains it is collateral and concentric in comparison with Mindon-Chimyonnik. is evidence of the proliferation of conductive bonds both outside and inside the phloem, i.e., to polycambiality. But this sign is not a systematic sign, but a climatic sign, because the climate of the middle zone of the mountain and other conditions of the external environment are significantly different from the conditions of the hills. Under these conditions, the stem dies from the cold if it is not hardened, ie if it is not sclerenchyma.

Similar stages of conduction system development are observed in the groups of CHust-Pop and Suluk-ota, except that the division of the 2-arched xylem at the base of the first group is from 4 years, as in Mount Suluk-Ata, Mount Khurjun , Starts in 2-3 years, and in the same year the inner cambium is also formed. Based on this information, it can be said that the Suluk-Ata mountain group originated from the CHust-Pop group.

Conclusion. In short, the mountain groups are primary and the mountain groups are secondary. This idea is confirmed by the emergence and proliferation of internal and concentric conductive bonds in the foothills of the Suluk-ota and Khurjun mountain ranges, which are secondary to the age of the hill groups, ie the early formation of polycambiality. .

The study of the anatomical structure of plant stems obtained from different points in the range of A. pungens type revealed the structure of the stem conduction system of this species in T.A. Madumarov (2004) “A. rungens. " It follows that A. rungens type, like A. albidum type, is polymorphic not only morphologically (Shishkin, 1936) but also anatomically.

The 2-arc structure of the annual growth of A. tenuifolium plant stem xylem approaches the Mindon-CHimyon group as it begins to separate into collateral ligaments in 5-6 years, but the formation of the inner cambium (in 5) brings it closer to the mountain group. . The area of this species is located in the eastern direction of the western Tien Shan with the area of the Suluk-ota mountain group, and in both of them the formation of the inner cambium, first of all A.I. This confirms Vvedensky's idea that the species is close to A. albidum, and secondly, it brings A. albidum closer to the Suluk-Ata mountain group.

The 2-arc structure of the annual growth of the Southern Black-tou group xylem of CHust-Pop, Mindon-Chimyon, A.tenuifolium, and A.rungens has a branching structure in 4-5 years and a multi-collateral bond structure in subsequent years. indicates that Madumarov belongs to type 3 "A.stenostegium". Suluk-ota mountain, Khurjun mountain, structure of plant stem taken from the south of A.tenuifolium type area, division A.rungens's Black-sand, Red-sand, Balkhash-alakul, groups, first year xylem forms a ring, the second year consists of 2 separate arcs, from the 3rd year the arches are divided into many colloteral radial conducting bonds, i.e., transition to polycambiality. The annual growth of xylem is evident only in A. Rungens's Balkhash-alakul groups. Taxons with such a structure are 6 – “A. Rungens” type.

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