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ON THE ORIGIN, CHEMICAL COMPOSITION, LEGAL STATUS, AND LIABILITY-RELATED ASPECTS OF PEGANUM HARMALA

Açar sözlər: peganum harmala, harmaline, harmine, psixotrop maddələr, bitki mənşəli halusinogenlər, təhlükəli bitkilər və psixoaktiv alkaloidlər.

Keywords: peganum harmala, harmaline, harmine, psychotropic substances, plant-derived hallucinogens, dangerous plants, and psychoactive alkaloids.

Anahtar kelimələr: peganum harmala, harmalin, harmin, psikotropik maddələr, bitki kaynaklı halüsinogenlər, təhlükəli bitkilər və psikoaktiv alkaloidlər.

Ключевые слова: гармала обыкновенная, гармалин, гармин, психотропные вещества, галлюциногены растительного происхождения, опасные растения, психоактивные алкалоиды.

In recent times, media outlets have reported cases where individuals transporting Peganum harmala plants to certain countries have been detained by law enforcement authorities, and such incidents have served as grounds for legal measures against them. In order to prevent citizens traveling abroad from facing undesirable circumstances, it is deemed appropriate to draw attention to the characteristics of Peganum harmala and to certain aspects that may entail legal liability in some jurisdictions.

Peganum harmala—a plant with a millennia-old tradition—has been widely used since antiquity both in folk medicine and in various cultural-ritual practices. Alongside its application as a natural therapeutic agent in traditional healing, it is also applied in some cultures as a means of psychological and spiritual protection.

Peganum harmala is more extensively utilized within the cultural traditions of the Middle East, Central Asia, and Anatolia. It predominantly grows in semi-desert and arid climatic zones, occurring naturally in countries such as Iran, Turkmenistan, Tajikistan, Azerbaijan (notably in Nakhchivan, Mughan, Absheron, and other regions), Turkiye, Afghanistan, and India.

Taxonomically, Peganum harmala belongs to the plant kingdom, order Sapindales, family Nitrariaceae, and genus Peganum. It is a perennial, glabrous herbaceous plant, distinguished by its strong, pungent odor, and typically reaches a height of 25–70 cm. The stem is erect; leaves are alternate and deeply divided into narrow, linear-lanceolate lobes, giving the plant a distinctive weedy appearance. Its seeds, roots, and stems are used for various purposes. Flowering occurs between May and July, with fruiting from July to August. The species is adapted to clay and sandy soils and is distributed across semi-desert zones, foothills, and mountainous areas at elevations of up to 2,800 meters above sea level.

Although Peganum harmala is widely distributed in the natural flora of Azerbaijan and holds a significant place in folk medicine, the psychotropic potential of the alkaloid compounds it contains necessitates a cautious approach to its use. Specifically, the β -carboline alkaloids present in the plant exert psychotropic effects on the central nervous system by inhibiting the degradation of neurotransmitters such as serotonin, dopamine, and norepinephrine, thereby producing psychoactive (mind-altering) effects.



(a)



(b)



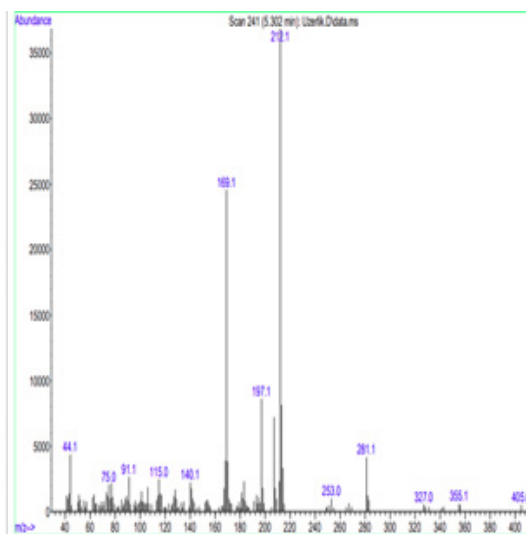
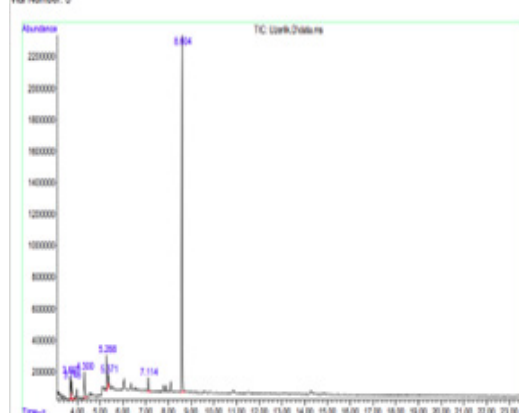
(c)

In connection with this issue, at the Forensic Expertise Center we conducted an analysis on one of the modern highly sensitive devices, which is a gas chromatograph-mass spectrometer. This device combines two methods that allow us to overcome the shortcomings of each of them, while maintaining their separation ability, high sensitivity, and information content. As a result of the analysis, we obtain chromatograms recorded by the full ion current of the mass spectrometric detector and a

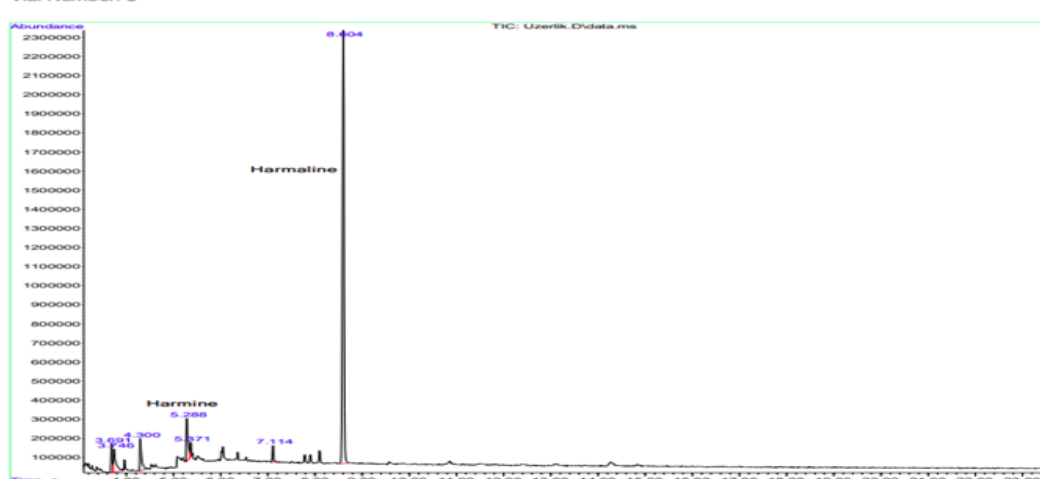
set of mass spectra recorded at any point of the chromatographic peaks. Using the database that is available in the device, peaks are identified by retention time and mass spectra.

For example, when studying the seeds of the *Peganum harmala* plant using a gas chromatograph-mass spectrometer, we determined the retention times of the main alkaloids and their isomers. Indeed, the seeds of this plant contain such alkaloids as Harmin (Harmin) and Harmalin (Harmaline) (chromatogram

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Sample Name: Uzerlik
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Vial Number: 5





and spectrogram are attached).

The primary psychoactive alkaloids present in the *Peganum harmala* are as follows:

1. **Harmine** – A psychoactive indole alkaloid. It is predominantly found in the seeds and roots. It exerts a potent effect by inhibiting the breakdown of serotonin and other neurotransmitters in the brain, leading to hallucinogenic activity.

2. **Harmaline** – Primarily located in the seeds. It is structurally similar to harmine but exhibits more potent effects, inducing visual and emotional alterations. Depending on the dosage, it can cause mood fluctuations, insomnia, and hallucinations.

3. **Harmol** – Compared to the other alkaloids, it has a weak, synergistic effect on the brain.

4. **Harman** – This alkaloid is weakly psychoactive and can have a stimulating effect on the nervous system. Analogous alkaloids can be found in trace amounts in tobacco smoke and brewed coffee.

5. **Peganine** – is minimally psychoactive and has an antispasmodic effect.

Pursuant to the Law of the Republic of Azerbaijan No. 960-IIQ of 28 June 2005, “On the approval of the lists of narcotic drugs, psychotropic substances

prohibited, restricted, or controlled in circulation within the territory of the Republic of Azerbaijan, as well as precursors requiring a license for import, export, transit, and manufacture within the Republic of Azerbaijan”, and the Law of the Republic of Azerbaijan No. 961-IIQ of 28 June 2005, “On the approval of the lists of significant, large, and especially large quantities of narcotic drugs and psychotropic substances constituting grounds for criminal liability”, the plant *Peganum harmala* and its psychoactive alkaloids are not included in the relevant lists. Accordingly, the circulation of this plant within the country is not subject to restriction.

From a chemical standpoint, *Peganum harmala* contains alkaloids such as harmaline, harmalol, and harman, which possess psychoactive properties (capable of inducing hallucinations). For this reason, in certain jurisdictions, it is recognized as a substance with restricted circulation.

From the perspective of legal liability, countries may be grouped into the following categories with respect to whether the circulation of *Peganum harmala* is unrestricted or prohibited:

№	Country	Specification of circulation	Notes
1.	USA	The circulation of the <i>Peganum harmala</i> plant itself is unrestricted; however, the import, production, and sale of its extracts are subject to restriction.	
2.	Australia	The <i>Peganum harmala</i> is included in the list of prohibited psychotropic substances.	
3.	Federal Republic of Germany	The circulation of the <i>Peganum harmala</i> plant itself is unrestricted; however, the import, production, and sale of its extracts are subject to restriction	
4.	Republic of Latvia	The circulation of the <i>Peganum harmala</i> plant itself is unrestricted; however, the import, production, and sale of its extracts are subject to restriction.	
5.	Republic of Lithuania	The <i>Peganum harmala</i> is included in the list of prohibited psychotropic substances.	
6.	Republic of Türkiye	The circulation of the <i>Peganum harmala</i> plant itself is unrestricted; however, the import, production, and sale of its extracts are subject to restriction.	
7.	Portuguese Republic	The <i>Peganum harmala</i> is classified within the list of prohibited psychotropic substances.	
8.	Kingdom of Belgium	The circulation of the <i>Peganum harmala</i> plant itself is unrestricted; however, the import, production, and sale of its extracts are subject to restriction.	



9.	Republic of Poland	The circulation of the Peganum harmala plant itself is unrestricted; however, the import, production, and sale of its extracts are subject to restriction.	
10.	Republic of Moldova	The Peganum harmala is classified within the list of prohibited psychotropic substances.	
11.	Republic of Estonia	The circulation of the Peganum harmala plant itself is unrestricted; however, the import, production, and sale of its extracts are subject to restriction.	
12.	Ukraine	The Peganum harmala is classified within the list of prohibited psychotropic substances.	
13.	Israel	The circulation of the Peganum harmala plant itself is unrestricted; however, the import, production, and sale of its extracts are subject to restriction.	
14.	Russian Federation	The Peganum harmala is classified within the list of prohibited psychotropic substances.	
15.	Georgia	The Peganum harmala is included in the list of prohibited psychotropic substances.	
16.	Republic of Belarus	The Peganum harmala is classified within the list of prohibited psychotropic substances.	
17.	Republic of Tajikistan	The Peganum harmala is classified within the list of prohibited psychotropic substances.	
18.	Kyrgyz Republic	The circulation of the Peganum harmala plant is unrestricted.	
19.	United Arab Emirates	The circulation of the Peganum harmala plant is unrestricted; however, the import, production, and sale of its extracts are subject to restriction.	
20.	Republic of China	The circulation of the Peganum harmala plant itself is unrestricted; however, the import, production, and sale of its extracts are subject to restriction.	

For the purpose of ensuring the safety of the citizens of the Republic of Azerbaijan, and taking into account that the transportation of the Peganum harmala to the countries listed, as well as from those countries into the Republic, may give rise to legal liability under the laws of those states, it is recommended that necessary measures be undertaken at border crossing points and customs checkpoints to prevent such cases, and that public awareness activities be carried out accordingly.

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ÜZƏRLİK (PEGANUM HARMALA) BİTKİSİNİN MƏNŞƏYİ, KİMYƏVİ TƏRKİBİ, HÜQUQİ STATUSU VƏ MƏSULİYYƏT DOĞURAN HALLARLA BAĞLI

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X Ü L A S Ə

Peganum harmala (xalq arasında "üzərlək" kimi tanınır) qədim zamanlardan bəri xalq təbabətində və mədəni-ritual mərasimlərində istifadə olunan bitkidir. Bu bitki əsasən Yaxın Şərq, Orta Asiya və Anadoluda geniş yayılmışdır, Azərbaycanda da təbii olaraq yetişir. Peganum harmalanın toxumları, kökləri və gövdəsi müxtəlif müalicəvi və qoruyucu məqsədlərlə istifadə olunur. Lakin bu bitkinin tərkibində psixoaaktiv xüsusiyyətlərə malik β -karbolin alkaloidləri (harmalin, harmine, harmol, harman və peganin) mövcuddur. Bu maddələr serotonin, dopamin və noradrenalin kimi neyrotransmitterlərin parçalanmasını əngəlləyərək, mərkəzi sinir sisteminə təsir edir və halüsinasiyalara səbəb ola bilər.

Aparılan laborator analizlər (GC-MS texnologiyası ilə) Peganum harmala toxumlarında bu alkaloidlərin mövcudluğunu təsdiqləmişdir. Bu səbəbdən bəzi ölkələrdə bitkinin və ya ondan əldə edilən ekstraktların dövriyyəsi qanunla məhdudlaşdırılmış və ya tamamilə qadağan edilmişdir. Azərbaycan Respublikasında isə Peganum harmala və onun tərkibindəki psixoaaktiv maddələr hazırkı qanunvericiliyə əsasən qadağan edilmiş maddələr siyahısına daxil deyil.

Lakin bir sıra ölkələrdə (məsələn, Avstraliya, Litva, Moldova, Ukrayna, Rusiya, Gürcüstan və s.) bu bitki psixotrop maddə kimi qiymətləndirilir və qanuni məsuliyyət doğura bilər. Bu baxımdan, Azərbaycan vətəndaşlarının xaricə səfərləri zamanı bu bitkini aparmaları hüquqi problemlərə səbəb ola bilər. Bununla əlaqədar olaraq, sərhəd-keçid məntəqələrində maarifləndirmə tədbirlərinin aparılması və nəzarət mexanizmlərinin gücləndirilməsi tövsiyə olunur.



ÜZERLİK BİTKİSİNİN KÖKENİ, KİMYASAL BİLEŞİMİ, HUKUKİ DURUMU VE SORUMLULUĞU GETİREN DURUMLAR

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ÖZET

Üzerlik (halk arasında “harmala” olarak bilinir), eski çağlardan beri halk hekimliğinde ve kültürel ve ritüel törenlerde kullanılan bir bitkidir. Bu bitki ağırlıklı olarak Orta Doğu, Orta Asya ve Anadolu’da yaygındır ve Azerbaycan’da da doğal olarak yetişir. Üzerlik’in tohumları, kökleri ve gövdeleri çeşitli tedavi ve koruyucu amaçlarla kullanılmaktadır. Ancak bu bitki, psikoaktif özelliklere sahip β -karbolin alkaloidleri (harmalin, harmin, harmol, harman ve peganin) içerir. Bu maddeler, serotonin, dopamin ve noradrenalin gibi nörotransmitterlerin parçalanmasını engelleyerek merkezi sinir sistemini etkiler ve halüsinasyonlara neden olabilir.

Laboratuvar analizleri (GC-MS teknolojisi kullanılarak), bu alkaloidlerin *Peganum harmala* tohumlarında varlığını doğrulamıştır. Bu nedenle, bazı ülkelerde bitkinin veya bitkiden elde edilen ekstraktların dolaşımı yasalarla kısıtlanmış veya tamamen yasaklanmıştır. Azerbaycan Cumhuriyeti’nde, *Peganum harmala* ve içerdiği psikoaktif maddeler, mevcut mevzuata göre yasaklı maddeler listesinde yer almamaktadır.

Ancak, bazı ülkelerde (örneğin Avustralya, Litvanya, Moldova, Ukrayna, Rusya, Gürcistan vb.) bu bitki psikotropik bir madde olarak kabul edilmekte ve yasal sorumluluğa yol açabilmektedir. Bu bağlamda, Azerbaycan vatandaşlarının yurt dışı seyahatleri sırasında bu bitkiyi yanlarında taşımaları yasal sorunlara yol açabilir. Bu bağlamda, sınır geçiş noktalarında bilinçlendirme önlemleri alınması ve kontrol mekanizmalarının güçlendirilmesi önerilmektedir.



ПРОИСХОЖДЕНИЕ, ХИМИЧЕСКИЙ СОСТАВ, ПРАВОВОЙ СТАТУС И СЛУЧАИ, ВОЗВРАЩАЮЩИЕ ОТВЕТСТВЕННОСТЬ РАСТЕНИЯ PEGANUM HARMALA

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РЕЗЮМЕ

Гармала обыкновенная (в народе «гармала») — растение, с древних времен используемое в народной медицине и культурно-ритуальных обрядах. Распространено преимущественно на Ближнем Востоке, в Центральной Азии и Анатолии, а также в естественной среде произрастает в Азербайджане. Семена, корни и стебли гармалы обыкновенной используются в различных лечебных и профилактических целях. Однако это растение содержит β -карболиновые алкалоиды (гармалин, гармин, гармол, гарман и пеганин), обладающие психоактивными свойствами. Эти вещества воздействуют на центральную нервную систему, ингибируя распад таких нейромедиаторов, как серотонин, дофамин и норадреналин, и могут вызывать галлюцинации.

Лабораторные исследования (с использованием технологии газовой хроматографии с масс-спектрометрией) подтвердили наличие этих алкалоидов в семенах гармалы обыкновенной (*Peganum harmala*). По этой причине в некоторых странах оборот растения или полученных из него экстрактов ограничен законом или полностью запрещён. В Азербайджанской Республике гармала обыкновенная (*Peganum harmala*) и содержащиеся в ней психоактивные вещества не включены в список запрещённых веществ согласно действующему законодательству.

Однако в ряде стран (например, в Австралии, Литве, Молдове, Украине, России, Грузии и др.) это растение считается психотропным веществом и может повлечь за собой юридическую ответственность. В связи с этим, перевозка данного растения гражданами Азербайджана во время поездок за границу может вызвать юридические проблемы. В этой связи рекомендуется проводить разъяснительную работу в пунктах пропуска через государственную границу и усиливать механизмы контроля.

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