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PRESERVING VEDIC PRACTICES (*Agnihotra)*: A SURVEY ON TRADITIONAL AND SCIENTIFIC APPROACHES

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ABSTRACT

India is known as rich biodiversity centre, in this aspect the Indian Himalaya regions particularly Uttarakhand is known as "Devboomi" (Land of God), this region possesses a tremendous variety of Flora and Faunas. Kumaun is well known for its traditions, cultural beliefs and spiritual aspects. There are many cultural festivals celebrated nationally and locally Agnihotra one of them. A questionnaire-based survey conducted on various districts of Kumaun. In which frequently ask questions related origin of Agnihotra, its cultural aspects, scientific importance, reason behind its celebration, its environmental aspects. The study was undertaken to document the plants related ethno-medicinal significance and plants which were applied in different ceremonies/ rituals, applied as Samidha etc. A total of 83 plant species were recorded during the survey. These are distributed across 77 genera and 48 families. Trees dominated the landscape, with 42 species, indicating the area likely contains a mix of forested or semi-forested regions. Herbs accounted for 21 species, reflecting the prevalence of smaller plants in understory or open spaces. Shrubs were represented by 18 species, indicating a significant presence of bushy vegetation. Only two species of grasses were recorded, representing that grass taxa were relatively uncommon in the study area. The traditional knowledge was collected from 107 informers by using open interviews and semi-structured questionnaires. This study will be important in preserving this plant-based practices of Kumaun as well as these important medicinal plants.

KEY WORDS: *Medicinal /Aromatic plants, Ceremonies/ Rituals, Scientific significance, Environmental effects, Modernization effects.*

INTRODUCTION

Indian culture is the heritage of social norms and technologies that originated and associated with the ethno-linguistically diverse India. The term also applies beyond India to countries and cultures whose histories are strongly connected to India by immigration, colonization, or influence, particularly in South Asia and Southeast Asia. India's languages, religions, dance, music, architecture, food and customs differ from place to place within the country. Indian culture, often labelled as a combination of several cultures, has been influenced by a history that is several millennia old, beginning with the Indus Valley civilization and other early cultural areas Mohamad, *et al*., (2007). Many elements of Indian culture, such as Indian religions, mathematics, philosophy, cuisine, languages, dance, music and movies have had a profound impact across the Indosphere, Greater India, and the world. Hinduism itself formed from various distinct folk religions, which merged during the Vedic period and following periods Levi, *et al.,* (1993). India is the birthplace of Hinduism, Buddhism, Jainism, Sikhism, and other religions. They are collectively known as Indian religions Stafford, (2006).

Uttarakhand comprises in two main divisions namely Kumaun and Garhwal region. There are many temples and holy places in Uttarakhand. The temples on the top of every mountain are symbols of religious spirit in the culture of Uttarakhand. It is believed that it is the place which is graced by the presence of gods and goddesses. Uttarakhand state is well known for its rich biodiversity and is known as the natural reservoir of India Sundriyal and Sharma, (2016). There is a diverse range of Floral, faunal and microbial wealth in Uttarakhand including rare and threatened species of plants and animals. Forests are the storehouse of the biodiversity and also help in regulating the climatic cycle. Uttarakhand has been traditionally known as the gold mine of medicinal plants and has declared as the herbal state in 2003. There are approx. 318 plant species of Ethno-botanical uses are Reported from the state having uses in condiments, spices, oil yielding, Alcoholic and non-alcoholic beverages, in various religion and culture Courses, arts and crafts, sacred values, religious festivals, bio-prospecting and miscellaneous purposes (Dobhal, *et al.,*2011). Kumaun region is rich in its natural resources as well as in its traditions and customs. There are many traditions which give the message of culture and nature conservation. It is the specialty of not only of Kumaun but also of our Indian culture that there is a cultural history behind every cultural activity. The local community of the area are highly religious and keep high reverence on religious practices. A variety of plant and their ingredients were usage in different rituals and also important as food, fodder, fiber, medicine as well as ecological and environment viewpoints. These types cultural practices also play an important role in the history of mankind. In

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Kumaun region local community basically depend on forests to fulfill all his needs for his survival since pre-historic age. Thus, nature is the first and closet companion of man.

As per Hindu mythology, it is believed that lord *Vishnu* spent three years on this mountain for devotion and penances. That's why this area and the adjacent hilly area are known as Kumaun (Arya and Pant, 2013). The Vedas, regarded as the eternal source of divine wisdom, contain profound spiritual and practical knowledge aimed at harmonizing human life with cosmic rhythms. Among the many sacred rituals described in these texts, *Agnihotra* holds a unique place as a fire sacrifice dedicated to the Sun and cosmic order. Rooted in the Atharva Veda and Yajur Veda, *Agnihotra* is performed precisely at sunrise and sunset, using a copper vessel, cow dung, ghee, and rice, along with the recitation of specific mantras. According to ancient traditions, this practice purifies the atmosphere, enhances panic energy, and promotes both physical and mental well-being. It is believed that *Agnihotra* fosters a connection between the individual and the cosmic forces, ensuring health, prosperity, and spiritual elevation. This paper explores both the traditional and scientific dimensions of *Agnihotra*, highlighting its significance in Vedic culture and its relevance in the modern world. And plants which were usages for performing these practices.

MATERIALS AND METHODS

Study Area: Present study was conducted in four localities of Kumaun region (Figure 1) i.e., Haldwani, Bageshwar, Almora, Champawat and Pithoragarh. The extending between 29.3932°N and 79.7400°E. The Kumaun region consists of a large Himalayan tract, together with two submontane strips called the Terai-Bhabar. Kumaun is home to a diverse range of Flora and Fauna. The region is considered quite important for its natural resources, environment, religious faith, and practices as mentioned in *Puranas* and other sacred literature. The forests of this region are dominated by *Quercus leucotrichophora* and *Q. floribunda* and are associated with the trees of *Cedrus deodara, Rhododendron arboreum,* etc. Due to the occurrence of moist, dense, and shady slopes, this region also has an abundance of growth of aromatic herbs and medicinal plants like *Berginia legulata* (*Pattarchatta*). *Valeriana jatamansi* (*Samewa*), *Artimisia* (*Paati*) etc.

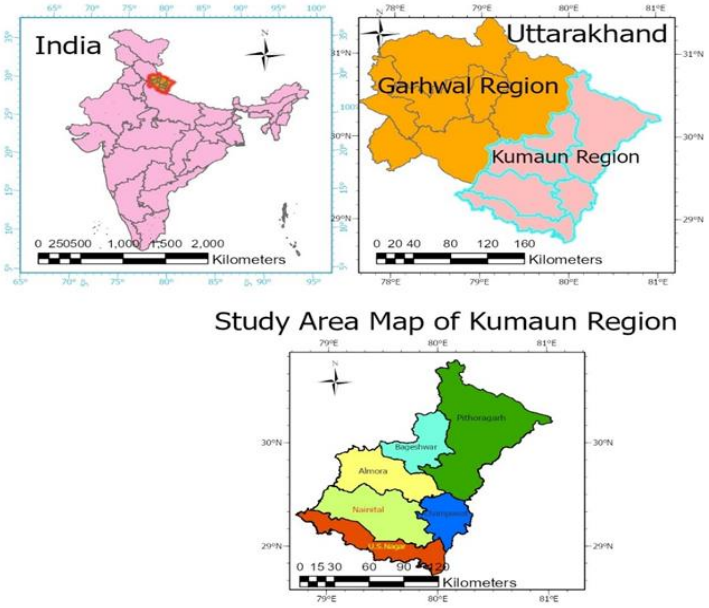


Figure 1. Location map of the study area

Demographic Information: The hole study was divided into four zones, that is Tarai region (Haldwani) from altitude range 400-600m; Subtropical region (Bageshwar) 700-1000m; Temperate region (Almora, Pithoragarh, Champawat) 1000-1300m these zones possess a high cultural as well as religious diversity and they used a variety of plant species to perform their rituals in the regions. Almost all the households of these areas keep faith on the local biodiversity and resources particularly on plants.

Data Collection: During the study field data were collected from all the four zones. For this purpose, semi-structured questionnaire was designed used. A total of 107 respondents from different places such as temples, sacred places, rituals associated with family deities, daily rituals of temples and, funeral rites were interviewed. The study involved the development of a research tool in the form of a semi-structured questionnaire to gather in-depth information on the traditional knowledge surrounding *Agnihotra* and its associated practices. This tool was meticulously designed to explore various dimensions of the ritual, including its

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origins, plant usage, socio-religious significance, and contemporary changes. It included questions addressing various aspects such as knowledge regarding the origin and historical significance of *Agnihotra*; local knowledge on identification of plants traditionally used in *Agnihotra*, their applications, and their cultural or spiritual importance; contemporary changes like observations on how *Agnihotra* practices have evolved and the factors influencing these changes; exploration of the ritual's spiritual significance and its alignment with scientific principles. This approach allowed for the identification of plant resources that hold both spiritual and medicinal importance and also emphasized the connections between cultural practices and ecological conservation.

DATA ANALYSIS

All the collected questionnaire samples were digitized systematically and analysis by standard statistical tools. Regular field records were accomplished at different time intervals in different seasons through interviews with the village peoples, family priests, temple priests, and the Vedic pandits who operate '*Havan*' and chanting mantras (Figure 2). The information on the use of plants and plant parts in '*Havan*' and their medicinal uses were collected from the concerned priests as well as from the local knowledgeable persons and herbal healers besides the folklore claims on medicinal uses of the plants in situ maintaining intimacy with the above stakeholders. The devotees were also have also interacted to collect information and their knowledge on the botanicals used in the '*Havan*' and their possible curative potential in the study area.

RESULTS AND DISCUSSION

An account of plants and their ingredients recorded during survey: Field survey conducted in the study area revealed a rich diversity of plant species, encompassing a total of 83 plant species distributed across 77 genera and 48 families (Table 1; Figure 3). This diversity underscores the ecological richness and the importance of preserving such a biodiverse habitat. Trees dominated the landscape, with 42 species, indicating the area likely contains a mix of forested or semi-forested regions. Herbs accounted for 21 species, reflecting the prevalence of smaller plants in understory or open spaces. Shrubs were represented by 18 species, indicating a significant presence of bushy vegetation.

Only two species of grasses were recorded, representing that grass taxa were relatively uncommon in the study area. Family Fabaceae emerged as the most represented family, with 7 species, displaying its adaptability to various ecological niches in the area. This family is well-known for its utility in traditional practices and ecological importance. Moraceae, with 4 species, was the second-most represented family. Its members are often valued for their ecological contributions, such as providing food and habitat for wildlife.

This questionnaire survey conducted on three different zones of the Kumaun region. Sub- tropical region (Bageshwar), Tarai region (Haldwani) and Temperate region (Almora, Pithoragarh and Champawat). In subtropical region climate is considered temperate to sub-humid, meaning it has moderate temperatures and rainfall levels.

The northern parts of the district, being at higher altitudes, experience cold temperature climates, especially in winter. The landscape includes sub-tropical forests with *Shorea robusta* (Sal) being a prominent tree species. Fauna includes various birds, leopards, and deer, with the area also serving as a sanctuary for species i.e., the Himalayan black bear and langur.

The Tarai region of Uttarakhand is characterized by a diverse ecosystem, boasting a rich variety of flora and fauna. The region features tropical deciduous forests with Shorea robusta (Sal), Dalbergia sissoo (Shisham), Khair, Semal, Haldu with grasslands and swampy areas. The fauna includes mammals i.e., Tigers, Asian elephants, Birds etc. The temperate region diverse array of flora and fauna with in their forest divisions.

These areas are home to a variety of trees, shrubs, herbs as well mammals, birds, and other wildlife. Forests are dominated by coniferous trees i.e., deodar, spruce and fir, along with broad-leaved trees like oak. The region is home to a variety of mammals, including musk deer, snow leopard, blue sheep, Himalayan black bear, and leopard.

Out of 83 plant species in subtropical region total 43 plant species were reported in which 11 herbs, 13 shrubs, 17 trees and 2 grasses. Temperate region were total 39 plant species were reported in which 12 herbs, 11 shrubs, 14 trees and 2 grass. And Tarai region were 53 plant species were reported in which 14 herbs, 13 shrubs and 24 trees and 2 grass were recorded. Some of these plants also mentioned in our religious texts as documented by Kumar, *et al.,* (2007). This shows their deep-rooted connection to traditional rituals and their recognition in religious literature. The local community actively cultivates these plants in courtyards, parks, gardens, and other accessible areas to ensure their regular availability for daily use and ceremonial purposes.

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Figure 2. Illustration of collecting knowledge during the field survey form various places

Table 1. An account of plants and their ingredients associated with *Agnihotra*

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S.N.	Plant name / Family	Local name	Sanskrit name	Growth form	Sub-tropical	Temperate region	Tarai region	Plant parts and their usage
1	*Abelmoschus moschatus* Medik. / Malvaceae	Kasturi	Lata Kasturi	Shrub	-	+	-	Used in worship of lord Shiva in Jageshwar temple
2	*Achyranthes aspera L./* Amaranthaceae	Chirchita	Apamarga	Herb	+	+	+	Leaves are used in worship of lord Ganesha, and wood used for making *Havan Samvidha*.
3	*Acorus calamus* L. / Acoraceae	Bach	Vaca	Herb	-	-	-	Leaves are used for worshipping goddess Nanda Devi, Kasar Devi and in Betaleshawar, Jageshwar temple.
4	*Aegle marmelos* (L.) Correa / Rutaceae	Bael Patri	Bilva	Tree	+	+	+	Leaves usage in worship of lord Shiva in both Jageshwar and Betaleshawar temple, and wood usage as *Samvidha* for *Agnihotra*.
5	*Anacardium occidentale* L. / Anacardiaceae	Cashew	Kajutaka	Tree	-	-	-	Usage as worship ingredients.
6	**Aquilaria malaccensis* Benth. / Thymelaceae	Agar	Aguru	Tree	-	-	-	Used in making *Havan Samagri* as described different incense manufacturing companies like Divya, MDH, Hari darshan, Aastha.
7	*Areca catechu* L./ Arecaceae	Supari	Kramuka	Tree	-	-	+	Used as worship ingredient.
8	*Artemisia vulgaris* L./Asteraceae	Paati	Nagadamani	Shrub	+	+	+	Traditionally used for making *Dhoop*/ *Havan Samagri.*
9	*Asparagus racemosus* Willd. / Asparagaceae	Satavar	Satavari	Shrub	-	-	-	Leaves are used for its medicinal properties.
10	*Azadirachta indica* A. Juss. / Meliaceae	Neem	Nimba	Tree	+	-	+	Use to make *Havan Samagri* as mentioned by Divya manufacturing company.
11	*Bacopa monnieri* (L.) Wettst. / Plantaginaceae	Brahmi	Indravalli	Herb	+	+	+	Leaf and stem both have high medicinal properties and used for memory enhancement.
12	*Betula utilis* D. Don / Betulaceae	Bhojpatra	Bhurja	Tree	+	+	-	Leaves are used in religious rituals i.e., *Katha Havan*.
13	**Buchanania lanzan* Spreng. / Anacardiaceae	Chirongi	Akhatth	Tree	-	-	-	Used as worship ingredient.
14	*Butea monosperma* (Lam.) Kuntze / Fabaceae	Dhak/ Palash	Palasa	Tree	-	-	+	Wood used for making *Havan Samvidha*.
15	*Calotropis gigantea* (L.) W. T. Aiton / Apocynaceae	Aak	Arka	Shrub	+	-	+	Wood used for making *Havan Samvidha.*
16	*Cannabis sativa* L. / Cannabanaceae	Bhang	Siddapatri	Herb	+	+	+	Its leaves are offered during *Shivratri pooja* at Jageshwar and Betaleshawar temple.

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17	**Catharanthus roseus* (L.) G. Don / Apocynaceae	Sadabahar	Sadapushpa	Herb	+	+	+	Flower petals used as medicine to treat diabetic patients.
18	*Cedrus deodara* (Roxb.ex D. Don) G. Don/ Pinaceae	Deodar	Amara	Tree	-	+	-	Wood seems to be pure and helpful to kill microbes, used as *Havan Samvidha.*
19	*Cinnamomum camphora* (L.) J. Presl / Lauraceae	Kapoor	Karpura	Tree	-	-	-	It is very important ingredient of worship, when burn as *Havan Samagri* its clear breathing system and create a positive atmosphere.
20	**Citrosa geranium (Pelargonium citrosum* Voigt ex Breiter) / Geraniaceae	Geranium	Paaranti	Shrub	+	+	+	Leaves are applied to make *Havan Samagri.*
21	*Cocos nucifera* L. / Arecaceae	Nariyal	Narikela	Tree	-	-	+	Fruits believed auspicious and offered for fulfilment of wishes in Jageshwar, Betaleshawar, Nanda Devi and Kasar Devi temples.
22	*Commiphora wightii* (Arn.) Bhandari / Burseraceae	Guggul	Gugglu	Tree	-	-	-	Its bark usage for making *Havan Samagri* as mentioned by Haridarshan manufacturing companies.
23	*Crocus sativus* L. / Iridaceae	Saffron	Kumkuma	Herb	-	-	-	Flowers offered in Jageshwar, Betaleshawar, Nanda Devi and Kasar Devi temples.
24	*Curcuma longa* L. / Zingiberaceae	Haldi	Haridra	Herb	+	+	+	Usage in religious rituals and i.e., marriage and *Janeu* ceremonies; also used as worship ingredients in Betaleshawar, Nanda Devi and Kasar Devi temples.
25	**Cuscuta cassytoides* Nees ex Engelm. / Convolvulaceae	Amar	Akasavalli	Shrub	+	-	+	Wood usage as *Havan Samvidha*.
26	*Cynodon dactylon* (L.) Pers./ Poaceae	Doob grass	Durva	Grass	+	+	+	Important ingredients of every religious ritual; prescription of this plant was mentioned on waste packets of different incense manufacturing companies i.e., Divya, MDH, Aastha and used for making *Havan Samagri.*
27	**Cyperus rotundus* L. / Cyperaceae	Nagarmotha	Varida	Herb	-	-	+	Its wood powder is used for preparing *Havan Samagri* as mentioned by various manufacturing companies i.e., Divya, Kamdhenu, MDH, Haridarshan, Aastha, Om Shanti, Dev Darshan for making *Havan Samagri.*
28	**Dalbergia sissoo* Roxb. ex DC. / Fabaceae	Shisham	Shinshapa	Tree	-	-	+	Wood usage as *Havan Samvidha*.

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29	*Datura stramonium* L./ Solanaceae	Dhatura	Umatta-virkshaha	Shrub	+	+	+	Its flowers usages for worship of lord Shiva during the time of Srawan or Shivratri fast in Jageshwar and Betaleshawar temple.
30	*Desmostachya bipinnata* (L.) Stapf / Poaceae	Kush grass	Khusha, Darbha	Grass	+	+	+	Wood used for preparing *Havan Samvidha.*
31	*Elaeocarpus sphaericus* (Gaertn.) Heer / Elaeocarpaceae	Rudraksha	Rudraksa	Tree	+	-	+	Very sacred plant used for worship of lord Shiva.
32	*Elettaria cardamomum* (L.) Maton / Zingiberaceae	Elaichi	Ela	Herb	-	-	-	Used as worship ingredient
33	*Ficus auriculata* Lour. / Moraceae	Timul	Udambra	Tree	+	+	+	Its leaves are usage in every religious ritual.
34	*Ficus benghalensis* L. / Moraceae	Banyan / Vat virish	Vata	Tree	+	+	+	Wood used as *Havan Samvidha.*
35	*Ficus racemosa L.* / Moraceae	Gular	Udumbara	Tree	-	-	+	Wood used as *Havan Samvidha.*
36	*Ficus religiosa* L. / Moraceae	Peepal	Pippala, Aswatha	Tree	+	+	+	Wood usage as *Samvidha* in *Agnihotra*, its tree worshiped by people for fulfilling wishes.
37	*Gossypium arboreum* L. / Malvaceae	Cotton	Raksatika	Shrub	+	-	+	Used as worship ingredient.
38	**Hedychium spicatum* Sm. / Zingiberaceae	Kapur-Kachri	Shathi	Herb	-	-	-	Used as worship ingredient.
39	*Hibiscus rosa-sinensis*, Lophira / Malvaceae	Gudhal	Mandara Pushpa	Tree	+	+	+	Used as worship ingredient.
40	*Hordeum vulgare* L. / Poaceae	Jaw (Barley)	Yava	Herb	+	+	+	Its seeds used in *Havan Samagri*
41	**Jasminum officinale* L. / Oleaceae	Chameli	Malati	Shrub	+	+	+	Flowers are offered during worship.
42	**Juglans regia* L. / Juglandaceae	Walnut	Aksota	Tree	+	+	-	Fruit used as worship ingredient
43	**Juniperus indica* Bertol. / Cupressaceae	Bil/ Juniper	Hapushaa	Shrub	+	+	+	Seeds are used for making *Havan Samagri* and wood as *Havan Samvidha*.
44	**Lavandula angustifolia* L. / Lamiaceae	Lavender	Laivendarah	Shrub	-	-	-	It is mentioned as ingredients of *Havan Samagri* by Dev Darshan manufacturing companies.

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45	*Mangifera indica* L. / Anacardiaceae	Mango	Aamra	Tree	+	-	+	Very important plant and its fruits are offered to the gods in all temples; wood seems to be pure usages as *Havan Samvidha*, leaves an important worship ingredient considered auspicious for performing *Kalash* in rituals.
46	**Mesua ferrea* L. / Calophyllaceae	Nagkesar	Nagakesara	Tree	-	-	-	Used as worship ingredient.
47	*Musa paradissica* L. / Musaceae	Banana (Kela)	Kadalika	Herb	+	+	+	Whole tree considered as a symbol of lord Vishnu; tree worshipped for fulfillment of desires; fruit is also worshipped.
48	*Myristica fragrans* Houtt. / Myristicaceae	Nutmeg (Jaiphal)	Jatipatra	Tree	-	-	-	Used as worship ingredient.
49	*Nelumbo nucifera* Gaertn. / Nelumbonaceae	Makhana	Kamalam, Padma	Herb	-	-	-	Important part of *Havan Samagri.*
50	*Nyctanthes arbor-tristis* L. / Oleaceae	Parijaat	Sephalika	Shrub	-	-	+	Flowers are offered to lord Shiva**.**
51	*Ocimum tenuiflorum* L. / Lamiaceae	Tulsi	Tulasi	Herb	+	+	+	Very sacred plant and usage for making *Havan Samagri* mentioned by different incense manufacturing companies i.e., Divya, Kamdhenu, Patanjali, Dev Darshan.
52	*Oryza sativa* L. / Poaceae	Chawal	Tandul	Herb	+	+	+	Used in *Katha Havan*, and an important ingredient of *Agnihotra* ritual.
53	*Phyllanthus emblica* L. / Phyllanthaceae	Aawala	Amalaki	Tree	+	+	+	Both leaves and fruits are used for worship.
54	*Pinus roxburghii* Sarg. / Pinaceae	Pine	Sarala	Tree	+	+	+	In hilly regions, wood used for making *Havan Samvidha.*
55	*Piper betle* L. / Piperaceae	Paan	Tambula	Herb	-	-	+	Used as worship ingredients.
56	*Piper nigrum* L. / Piperaceae	Black pepper	Maricha	Tree	-	-	-	Used as worship ingredients.
57	**Pleurospermum brunonis* (DC.) Benth.ex C.B. Clarke / Apiaceae	Gokul	-	Tree	-	-	-	Wood usage as *Havan Samvidha*.
58	*Prosopis cineraria* (L.) Druce / Fabaceae	Shami	Jivanti	Tree	-	-	+	Flowers are offered to lord Shiva, and wood used as *Havan Samvidha.*
59	*Prunus cerasoides* Koidz. / Rosaceae	Padam/ Paiya	Padmaka	Tree	+	+	-	Leaves used in every ritual; plant seems to be pure; wood also usage as *Havan Samvidha* for *Agnihotra.*

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60	*Prunus dulcis* (Mill.) D.A. Webb / Rosaceae	Badaam/Almond	Vatada	Tree	-	-	-	Used as worship ingredient.
61	**Psoralea corylifolia* L./ Fabaceae	Babchi seeds	Bakuchi	Herb	-	-	-	Used for making *Havan Samagri* mentioned on the products of Divya and Patanjali *Dhoop* manufacturing companies
62	*Pterocarpus santalinus* Blanco / Fabaceae	Laal chandan	Rakta-chandana	Tree	-	-	-	Wood used as *Havan Samvidha*.
63	*Rosa indica* L. / Rosaceae	Rose (Gulab)	Taruni	Shrub	+	+	+	Flower offered in the worship in Nanda Devi, Kasar Devi, Betaleshawar and Jageshwar temple.
64	**Salvia rosmarinus* Spenn. / Lamiaceae	Rosemary	Rusmari	Shrub	+	+	+	Used in aromatherapy.
65	*Santalum album* L. / Santalaceae	Chandan	Chandanam	Tree	-	-	+	Wood seems to be pure usages as *Havan Samvidha*; applying its paste give a cooling effect.
66	*Senegalia catechu* (L.F.) P.J.H. Hurter & Mabb. / Fabaceae	Khair	Khadira	Tree	-	-	+	Wood used for making *Havan Samvidha.*
67	*Sesamum indicum* L. / Pedaliaceae	Sesame seed (Til)	Tila	Shrub	+	+	+	Important part of religious rituals i.e., marriage ceremony, *Janeu* ceremony, temple worship and also used by various manufacturing companies for making *Havan Samagri.*
68	**Skimmia laureola* (DC.) Decne/ Rutaceae	Nair	Kedar pati	Shrub	+	+	-	Due to its aromatic and medicinal properties, it is used in *Havan Samagri.*
69	**Sphaeranthus indicus* L. / Asteraceae	Gorkhmundi	Kadamb puspika	Herb	-	-	+	Used for making *Havan Samagri* described by Divya, Patanjali, Aastha *Dhoop* manufacturing companies.
70	*Styrax benzoin* Dryand. / Styracaceae	Loban	Ashvamurti	Tree	-	-	-	Used as worship ingredient.
71	*Syzygium aromaticum* (L.) Merr. &L.M. Perry / Myrtaceae	Clove (Laung)	Lavanga	Tree	-	-	-	Used as worship ingredient.
72	*Syzygium cumini* (L.) Skeels / Myrtaceae	Jamun	Jambufalam	Tree	-	-	+	Used as worship ingredient.
73	*Tagetes erecta* L. / Asteraceae	Genda	Sthulapushpa	Herb	+	+	+	Flowers are used for worship and making garland during Deepawali and offered to goddess Lakshmi; its petals are used for making *Havan Samagri.*
74	*Terminalia arjuna* (Roxb.ex DC.) Wight & Arn. / Combretaceae	Arjun	Arjuna	Tree	+	-	+	Wood usage as *Havan Samvidha*.

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75	**Thuja occidentalis* L. / Cupressaceae	Thuja	-	Tree	+	+	+	Wood used for making *Havan Samvidha.*
76	*Tinospora cordifolia* (Willd.) Hook.f. & Thomson / Menispermaceae	Giloy/ Amrita	Guduchi	Herb	+	+	+	Wood used for its medicinal properties and for making *Havan Samvidha.*
77	**Vachellia nilotica* (L.) P.J.H. Hurter & Mabb. / Fabaceae	Kikar	Barbura	Shrub	+	-	-	Wood usage as *Havan Samvidha*.
78	*Valeriana jatamasi* Jones ex Roxb. / Caprifoliaceae	Jatamasi	Tapasvini	Herb	-	+	-	Whole plant used for making incense.
79	**Vitex negundo* L./ Verbenaceae	Nirgundi	Indrani	Shrub	-	-	+	Betaleshawar and Jageshwar temple as applied worship ingredient.
80	*Vitis vinifera* L. / Vitaceae	Kishmish	Draksa	Tree	+	+	+	Used as worship ingredient.
81	*Withania somnifera* (L.) Dunal / Solanaceae	Ashwagandha	Rasayana	Tree	+	+	+	Wood usage as *Havan Samvidha*; also used as medicinal purpose.
82	*Zanthoxylum armatum* DC. / Rutaceae	Timur	Tejovati	Tree	-	+	-	Its stick helpful in both purposes medicinally as well as in religious ritual i.e., *Janeu* Sanskar and also used in Kumauni Jaggar (a folk culture).
83	*Ziziphus mauritiana* Lam. / Rhamnacae	Ber	Kola	Tree	-	-	+	In the occasion of *Shivratri* its fruit are offered to lord shiva for wish fulfilment.

**Plants not mentioned in the sacred texts*

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Community perceptions on its essential aspects

Socio- religious beliefs based on origin of *Agnihotra*- The origin of *Agnihotra* has numerous explanations. About 33% of people believe that it originated from offerings made to deities during religious rituals, as mentioned in the *Vedas.* 12% think it began to please deities for good rainfall, fulfillment of desires, and abundance of food. 10% suggest it was to maintain nature's balance, ensure good energy, and eliminate harmful elements. Another 9% provide different view; it started for happiness and prosperity, to purify the environment during the Vedic period, and is a ritual described in the *Yajurveda*, *Samhita.* Meanwhile, 7% claim that *Prajapati Daksha* initiated *Agnihotra* as per the *Vayu Purana*, 6% trace its origins to the praise of *Agnidev* in *Rigveda* (1/1/1/), and 4% believe it is mentioned in the *Atharvaveda* (11/7/9).

Environmental and scientific effects of *Agnihotra*- Questionnaire survey responses reveal that 90% of participants believe the plants used in *Havan Samagri* are pure and aromatic, and their burning creates a positive atmosphere. Regarding the effects of attending Agnihotra, 47% of respondents reported experiencing complete (100%) physical and mental well-being improvements. Meanwhile, 10% observed a 90% improvement, 26% noted an 80% change, 10% reported a 50% improvement, and 4% experienced a 30% change in their overall well-being. Additionally, 19% of respondents indicated that using the ashes from *Agnihotra* contributes to better crop yields. 75% believe the practice purifies the environment and provides mental peace, while 83% feel it not only enhances environmental quality but also eliminates negative energy. Lastly, 8% of participants think the smoke from a *Havan* destroys harmful microorganisms that pose a danger to human life.

Dispersion of *Havan* material- The disposal of worship materials holds significant importance from both cultural and environmental perspectives. According to survey responses a maximum (37%) think that ashes and other materials left after *Agnihotra* or other religious rituals contain nutrients that enhance the fertility of the soil. And (58%) believe that dispersing worship ingredients near water sources (rivers, ponds, lakes) holds both religious and scientific importance. Religiously, it is believed that this purifies the water, as these materials mix with the water and naturally promote its purification. From an environmental perspective, the correct disposal of these materials in water bodies can help keep the water clean without causing pollution.

Community views about the modernization in Vedic practices (*Agnihotra*)- The survey emphasizes various perspectives on the effect of modernization on culture and how it can be preserved. A significant portion of respondents (51%) believe that raising awareness is crucial and that children should be taught about the importance of their religion and culture from a young age. About 10% of respondents feel that modernity has led to a visible influence of western culture on religious and cultural activities, which is slowly corroding their own traditions, and they see this as a collective responsibility. Additionally, 14% suggest that just as today's youth are drawn to music and films, efforts should be made to present culture in a similarly engaging way to capture their interest. Finally, 19% believe that by connecting Vedic education and literature with modern culture, it can be made more relevant and appealing to the younger generation.

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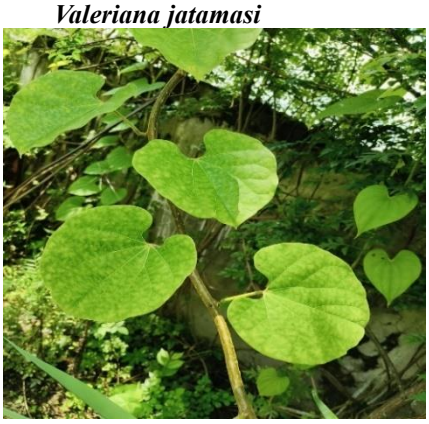
Valeriana jatamasi



Rosa indica



Artemisia vulgaris



Tinospora cordifolia



Tagetes erecta **L.**



Citrosa geranium



Skimmia laureola



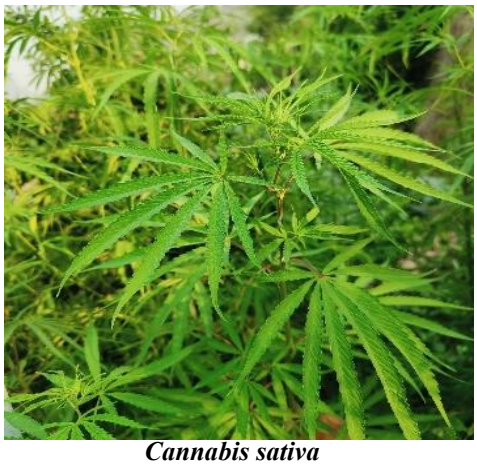
Thuja occidentalis



Datura stramonium

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Aegle marmelos


Cannabis sativa


Curcuma longa


Ficus auriculata


Ficus religiosa


Ocimum sanctum

Figure 3. Illustration of plant recorded during survey

CONCLUSION

From a scientific perspective, *Agnihotra* is an environmental and bioenergetic phenomenon that has been the subject of growing research. In some studies, it was found that the combustion of organic materials during the ritual release's volatile compounds with air-purifying properties, reducing microbial load and neutralizing pollutants. *Agnihotra* ash has been analyzed for its beneficial effects on soil fertility, plant growth, and water purification. Additionally, preliminary investigations indicate its potential role in stress reduction and mental well-being, possibly due to the synchronized rhythmic chanting, which influences brain wave activity. Despite its historical significance and potential benefits, the practice of *Agnihotra* is at risk due to modernization, urbanization, and the declining transmission of Vedic traditions. To preserve this ancient wisdom, efforts are being made to document, scientifically validate, and digitize *Agnihotra*-related knowledge, ensuring its continuity for future generations. *Agnihotra*, a Vedic fire ritual, has been practiced in the Kumaun region of India for centuries. It involves the burning of specific plant materials, including medicinal herbs, cow dung, and ghee, at precise timings. Traditional wisdom suggests that *Agnihotra* has beneficial effects on air purification and microbial balance. The study of plants used in Kumaun *Agnihotra* practices and their influence on aeromicroflora, small microbes have significant scientific, environmental, and health-related implications. In hilly regions, local communities rely heavily on cultivating a variety of plants to support both their livelihoods and cultural practices. Future research can bridge the gap between ancient wisdom and modern scientific validation, leading to practical applications in air purification, healthcare, and sustainable agriculture.

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