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Herbal Plants of Rajasthan and Their Role in Medicine

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ABSTRACT: Herbal medicine (also called herbalism, phytomedicine or phytotherapy) is the study of pharmacognosy and the use of medicinal plants, which are a basis of traditional medicine.^[1] With worldwide research into pharmacology, some herbal medicines have been translated into modern remedies, such as the anti-malarial group of drugs called artemisinin isolated from *Artemisia annua*, a herb that was known in Chinese medicine to treat fever.^{[2][3]} There is limited scientific evidence for the safety and efficacy of many plants used in 21st-century herbalism, which generally does not provide standards for purity or dosage.^{[1][4]} The scope of herbal medicine sometimes include fungal and bee products, as well as minerals, shells and certain animal parts.^[5] Paraherbalism describes alternative and pseudoscientific practices of using unrefined plant or animal extracts as unproven medicines or health-promoting agents.^{[1][4][6][7]} Paraherbalism relies on the belief that preserving various substances from a given source with less processing is safer or more effective than manufactured products, a concept for which there is no evidence

KEYWORDS-herbal, plants, medicine, Rajasthan, drugs

I.INTRODUCTION

Eight villages in the arid regions of western Rajasthan are fast progressing towards sustainable development by venturing into growing Shankhpushpi, a medicinal herb which is scientifically proven to enhance memory and brainpower. Situated in the arid region with annual rainfall less than sufficient even for one crop in a year, the farmers grows traditional crops Bajra, Guar and Moth that have less commodity value. Until recently, they weren't aware that organic composition of the soil added with integrated farming system can yield them two other crops - Shankhpushpi and another traditional crop - which can increase their annual incomes significantly.

Convolvulus prostratus (*Convolvulus pluricaulis*^[1]) is an herb found in Rajasthan that is used in Ayurveda.^[2] The Ayurveda preparation shankapushpi is, according to most sources, identical with *Convolvulus prostratus*, but some say shankapushpi (अपराजिता) is instead *Clitoria ternatea*. Shankhpushpi has been used traditionally as a brain tonic and is believed to help a wide range of issues. It is believed to have demonstrated potential for anxiolytic, relaxant, and anti-obsessive effects, as well as nootropic effects.

Shankhpushpi has been found to help significantly with memory retention. In cholesterol-fed gerbils shankapushpi was observed to have significantly helped reduce serum cholesterol, low density lipoprotein cholesterol, and triglycerides after ninety days. Shankhpushpi also demonstrated a thyroid suppressing effect when administered (at 0.4 mg/kg) to mice with hyperthyroidism. It has been studied for use as anticonvulsant with mixed results.^[3]

Ocimum tenuiflorum, commonly known as holy basil or *tulsi*, is an aromatic perennial plant in the family Lamiaceae. Leaves are green or purple; they are simple, petioled, with an ovate blade up to 5 cm (2 in) long, which usually has a slightly toothed margin; they are strongly scented and have a decussate phyllotaxy. The purplish flowers are placed in close whorls on elongated racemes.^[6]

The three main morphotypes cultivated in India and Nepal are *Ram tulsi* (the most common type, with broad bright green leaves that are slightly sweet), the less common purplish green-leaved (Krishna or *Shyam tulsi*) and the common wild *vana tulsi* (e.g., *Ocimum gratissimum*).^[8]

The plant and its oil contain diverse phytochemicals, including tannins, flavonoids, eugenol, caryophyllenes, carvacrol, linalool, camphor, and cinnamyl acetate, among others.^{[9][10]} One study reported that the plant contains an eponymous family of 10 neolignan compounds called *tulsinol A-J*.^[11]

Specific aroma compounds in the essential oil are camphor (32%), eucalyptol (19%), α -bisabolene (17%), eugenol (14%), germacrene (11%) and β -bisabolene (11%).^{[12][11]} In addition, more than 60 different aroma compounds were found through gas chromatography–mass spectrometry analysis of holy basil.^[12] However, other studies have stated *tulsi* essential oil consists mostly of eugenol (70%) β -elemene (11%), β -caryophyllene (8%), and germacrene (2%),

with the balance being made up of various trace compounds, mostly terpenes. *Tulasi* is a sacred plant for Hindus, particularly the Vaishnavite sect.[1,2,3] It is worshipped as the avatar of Lakshmi, and is often planted in courtyards of Hindu houses or temples to Hanuman.^[22] The ritual lighting of lamps each evening during *Karthik* includes the worship of the *tulsi* plant.^{[23][24]} Vaishnavites are also known as "those who bear the *tulsi* around the neck".^[22] *Tulasi Vivaha* is a ceremonial festival performed between *Prabodhini Ekadashi* (the 11th or 12th lunar day of the bright fortnight of the Hindu month of Kartika) and *Kartik Purnima* (the full moon of the month).^{[25][26]} Every evening, Hindus place earthen lamps in front of tulsi plants. During the festivals celebrated in Rajasthan people light earthen lamps (*diya*) at the foot of the household tulsi plants and pray.

II.DISCUSSION

Withania somnifera, known commonly as ashwagandha or winter cherry,^{[2][3][4]} is an evergreen shrub in the Solanaceae or nightshade family that grows in Rajasthan. Several other species in the genus *Withania* are morphologically similar.^[3]

The plant, particularly its root powder, has been used for centuries in traditional Indian medicine.^[5] Although used in herbal medicine and sold as a dietary supplement, there is insufficient scientific evidence that *W. somnifera* is safe or effective for treating any health condition or disease.^{[3][4]}

Description

This species is a short shrub growing 35–75 cm (14–30 in) tall. Tomentose branches extend radially from a central stem. Leaves are dull green, elliptic, usually up to 10–12 cm (3.9–4.7 in) long. The flowers are small, green and bell-shaped. The ripe fruit is orange-red.^[3]

Etymology

The Latin species name *somnifera* means "sleep-inducing".^[6] The name "ashwagandha" is a combination of the Sanskrit words '*ashva*', meaning horse, and '*gandha*', meaning smell, reflecting that the root has a strong horse-like odor.^[3]

Cultivation

W. somnifera is cultivated in many of the drier regions of India. It prefers dry stony soil with sun to partial shade. It can be propagated from seeds in the early spring or from greenwood cuttings in the later spring.^[9]

Diseases and pests[4,5,6]

Withania somnifera is prone to several pests and diseases. Leaf spot disease caused by *Alternaria alternata* is the most prevalent disease, which occurs in a severe form here. Leaf spot disease reduces the concentration of its secondary metabolites.^[10] The leaves are also prone to *Alternaria dianthicola*.^[11]

A treehopper (*Oxyrachis tarandus*) feeds on the apical portions of the stem, making them rough and woody in appearance and brown in colour.^[12]

The carmine red spider mite (*Tetranychus urticae*) is the most prevalent pest of the plant in India.^[13] In recent years, this plant has been serving as a new reservoir host for an invasive mealybug species *Phenacoccus solenopsis*.^[14]

Phytochemistry

The main phytochemical constituents of *W. somnifera* are withanolides, a group of triterpene lactones that include withaferin A, alkaloids, steroidal lactones, tropine, and cuscohygrine.^[3] Forty withanolides, twelve alkaloids, and various sitoindosides have been isolated from this plant species.^[3] Because these withanolides are structurally similar to the ginsenosides of *Panax ginseng*, *W. somnifera* is commonly referred to as "Indian ginseng".^[3]

Adverse effects

W. somnifera may cause adverse effects if taken alone or together with prescription drugs.^{[3][4][15]} Side effects may include diarrhea, headache, sedation, or nausea, and the product should not be used during pregnancy or breastfeeding

Catharanthus roseus, commonly known as bright eyes, Cape periwinkle, graveyard plant, Madagascar periwinkle, old maid, pink periwinkle, rose periwinkle,^[2] is a perennial species of flowering plant in the family Apocynaceae. The leaves are oval to oblong, 2.5–9 cm (1.0–3.5 in) long and 1–3.5 cm (0.4–1.4 in) wide, glossy green, hairless, with a pale midrib and a short petiole 1–1.8 cm (0.4–0.7 in) long; they are arranged in opposite pairs. The flowers range from white with a yellow or red center to dark pink with a darker red center, with a basal tube 2.5–3 cm (1.0–1.2 in) long and a corolla 2–5 cm (0.8–2.0 in) diameter with five petal-like lobes. The fruit is a pair of follicles 2–4 cm (0.8–1.6 in) long and 3 mm (0.1 in) wide. The species has long been cultivated for herbal medicine, as it can be traced back from Rajasthan.^[22] In Ayurveda (Indian traditional medicine) the extracts of its roots and shoots, although poisonous, are used against several diseases. In traditional medicine, extracts from it have been used against numerous diseases, including diabetes, malaria, and Hodgkin's lymphoma.^[13] In the 1950s, vinca alkaloids, including vinblastine and vincristine, were isolated from *Catharanthus roseus* while screening for anti-diabetic drugs.^[23] This chance discovery led to increased research into the chemotherapeutic effects of vinblastine and

vincristine. Conflict between historical indigenous use, and patent from 2001 on *C. roseus*-derived drugs by western pharmaceutical companies, without compensation, has led to accusations of biopiracy.[7,8,9]

Vinblastine and vincristine, chemotherapy medications used to treat several types of cancers, are found in the plant^{[25][26][27][28]} and are biosynthesised from the coupling of the alkaloids catharanthine and vindoline.^[29] The newer semi-synthetic chemotherapeutic agent vinorelbine, used in the treatment of non-small-cell lung cancer,^{[27][30]} can be prepared either from vindoline and catharanthine^{[27][31]} or from the *vinca* alkaloid leurosine,^[32] in both cases via anhydrovinblastine.^[31] The insulin-stimulating vincoline has been isolated from the plant.

Despite the medical importance and wide use, the desired alkaloids (vinblastine and vincristine) are naturally produced at very low yields. Additionally, it is complex and costly to synthesize the desired products in a lab, resulting in difficulty satisfying the demand and a need for overproduction.^[35] Treatment of the plant with phytohormones, such as salicylic acid^[36] and methyl jasmonate,^{[37][38]} have been shown to trigger defense mechanisms and overproduce downstream alkaloids. Studies using this technique vary in growth conditions, choice of phytohormone, and location of treatment. Concurrently, there are various efforts to map the biosynthetic pathway producing the alkaloids to find a direct path to overproduction via genetic engineering in Rajasthan. Rosinidin is the pink anthocyanidin pigment found in the flowers of *C. roseus*.^[46] Lochnericine is a major alkaloid in roots.[10,11,12]

III.RESULTS

Aloe vera is a species of succulent plant in the genus *Aloe* mostly found in Rajasthan. It is originally from the Arabian Peninsula but it grows wild in tropical climates around the world. It is a popular houseplant species.^[3]

Aloe vera is used in many consumer products. These include drinks, skin lotion, cosmetics, and ointments for small burns and sunburns. There is little scientific evidence that *Aloe vera* works for treating burns or sunburns or that it is safe for treating them. The leaves of *Aloe vera* contain significant amounts of the polysaccharide gel acemannan, which can be used for topical purposes.^[7] Aloe skin contains aloin which is toxic. Products made from *Aloe vera* usually only use the gel.

There are many products containing aloe vera's *acemannan*, including skin lotions, cosmetics, ointments and gels for minor burns, skin abrasions, insect bites, and windburn.^[8]

Oral ingestion of aloe vera extracts can be dangerous, because it causes reactions which are not yet fully understood.^{[5][9]} It is especially dangerous for pregnant women. Some people have allergic reactions, even when the aloe vera is applied only to the skin.[13,14,15]

Two substances from *Aloe vera* – a clear gel and its yellow latex – are used to manufacture commercial products.^{[9][39]} Aloe gel typically is used to make topical medications for skin conditions, such as burns, wounds, frostbite, rashes, psoriasis, cold sores, or dry skin.^{[9][39]} Aloe latex is used individually or manufactured as a product with other ingredients to be ingested for relief of constipation.^{[9][39]} Aloe latex may be obtained in a dried form called *resin* or as "aloe dried juice".^[53]

There is conflicting evidence regarding whether *Aloe vera* is effective as a treatment for wounds or burns.^{[5][39]} There is some evidence that topical use of aloe products might relieve symptoms of certain skin disorders, such as psoriasis, acne, or rashes,^{[9][39]} but topical application may cause an allergic reaction in some people.^[11]

Aloe vera gel is used commercially as an ingredient in yogurts, beverages, and some desserts,^[54] but at high or prolonged doses, ingesting aloe latex or whole leaf extract can be toxic.^{[5][9][11][15]} Use of topical aloe vera in small amounts is likely to be safe.

Aloin, a compound found in the semi-liquid latex of some *Aloe* species, was the common ingredient in over-the-counter (OTC) laxative products in the United States until 2002 when the Food and Drug Administration banned it because manufacturers failed to provide the necessary safety data.^{[5][9][58]} *Aloe vera* has potential toxicity, with side effects occurring at some dose levels both when ingested and when applied topically.^{[5][15]} Although toxicity may be less when aloin is removed by processing, *Aloe vera* ingested in high amounts may induce side effects, such as abdominal pain, diarrhea or hepatitis.^{[5][59]} Chronic ingestion of aloe (dose of 1 gram per day) may cause adverse effects, including hematuria, weight loss, and cardiac or kidney disorders.^[5] Ingested aloe products may have adverse interactions with prescription drugs, such as those used to treat blood clots, diabetes, heart disease and potassium-lowering agents (such as Digoxin), and diuretics, among others[16,17,18]

Taro (*Colocasia esculenta*) is a root vegetable. It is the most widely cultivated species of several plants in the family Araceae that are used as vegetables for their corms, leaves, stems and petioles especially in Rajasthan. The plant has rhizomes of different shapes and sizes. Leaves are up to 40 by 25 centimetres (15+ $\frac{1}{2}$ by 10 inches) and sprout from the rhizome. They are dark green above and light green beneath. They are triangular-ovate, sub-rounded and mucronate at the apex, with the tip of the basal lobes rounded or sub-rounded. The petiole is .8–1.2 metres (2+ $\frac{1}{2}$ –4 feet) high. The path can be up to 25 cm (10 in) long. The spadix is about three fifths as long as the spathe, with flowering parts up to 8 millimetres ($\frac{3}{8}$ in) in diameter. The female portion is at the fertile ovaries intermixed with

sterile white ones. Neuters grow above the females, and are rhomboid or irregular orium lobed, with six or eight cells. The appendage is shorter than the male portion.

In Rajasthan, Taro generally commands a higher market price in comparison to other root crops, so the quality control measures throughout the production process are rather essential. The sizes found in most markets are 1–2 kg and 2–3 kg. The best size for packaging and for consumers is 1–2 kg. To guarantee the product meets the expected high standards upon reaching the consumer, there are some common grading standards for fresh corms:^[60]

- No excess soil, softness or decay
- No bruises or deep cuts
- Spherical to round shape
- No major abnormal deformities
- No roots
- Approximately 5 cm (under 2") of petiole left attached to the corm
- No double-tops

Due to the high moisture content of the corms, and the plant's natural love of humidity, mold and disease can easily develop, causing root rot or decay. To prolong their shelf lives, the corms are usually stored at cooler temperatures, ranging from 10 to 15 degrees Celsius and maintained at a relative humidity of 80% to 90%. For packaging, the corms are commonly placed in polypropylene bags or ventilated wooden crates to minimize condensation and 'sweating.'

By villegers, it is called *Patar Vel* or *Saryia Na Paan* green leaves are used by making a roll, with besan (gram flour), salt, turmeric, red chili powder all put into paste form inside leaves. Then steamed and in small portions, as well as fried in the deep fryer.

It is also sold as an ornamental plant, often by the name of elephant ears. It can be grown indoors or outdoors with high humidity[19,20]

IV.CONCLUSION

Rajasthan government has planned a new scheme called Rajasthan Ghar Ghar Aushadhi Yojana to promote the use of Ayurvedic and medicinal herbs across the state. The state government is planning to implement the scheme to boost the immunity and defense system of the citizens of the state. Under this Rajasthan Ghar Ghar Aushadhi Yojana, medicinal plants like Tulsi, Ashwagandha, Giloy and Kalmegh will be distributed.

The main objective of the Rajasthan Ghar Ghar Aushadhi Yojana is to provide medicinal plants like Tulsi, Ashwagandha, Giloy and Kalmegh to everyone.

1. It aims to promote medicinal plants and their use in daily life
2. It aims to help people to boost their immunity, lead a healthy and disease-free life
3. Each family will be provided 24 saplings over a period of 5 years
4. This Rajasthan Ghar Ghar Aushadhi Yojana will help in boosting a strong defence system which will lead to a good health for all and thus overall development in the state.[21]

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