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## STUDY OF FERTILITY-PROMOTING MEDICINAL PLANTS USED BY TRIBAL COMMUNITIES OF AKOLA REGION, AHILYANAGAR (MAHARASHTRA, INDIA): AN ETHNOPHARMACOGNOSTIC APPROACH

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### Keywords:

Fertility enhancement,  
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**ABSTRACT:** Infertility is a growing global health concern affecting both men and women. In tribal regions of India, traditional medicinal plants remain the primary source of treatment for reproductive disorders. The Akola region of Ahilyanagar District (Maharashtra) possesses a profound, traditional knowledge base on botanicals that boost reproductive health. **Objective:** The present study aims to document fertility-promoting medicinal plants used by tribal communities of the Akola region and to correlate traditional claims with available pharmacognostic, phytochemical, and pharmacological evidence. **Materials and Methods:** Ethnobotanical surveys were conducted through personal interviews with tribal healers and elderly practitioners. Plants were identified botanically and validated using standard floras. Literature analysis was performed using Scopus, PubMed, and peer-reviewed pharmacognosy journals to evaluate pharmacological mechanisms. **Results:** A total of 40 medicinal plant species belonging to 29 families were documented. These plants are traditionally used as fertility enhancers, aphrodisiacs, or reproductive tonics. Pharmacological evidence indicates mechanisms such as antioxidant activity, hormone modulation, adaptogenic action, and gonadoprotective effects. **Conclusion:** Traditional fertility-promoting plants of the Akola region possess significant pharmacological potential. Scientific validation, conservation strategies, and ethical documentation of indigenous knowledge are essential for sustainable utilization and drug development.

**INTRODUCTION:** Infertility is defined as the inability to conceive after 12 months of regular unprotected sexual intercourse and affects nearly 10–15% of couples worldwide<sup>1</sup>. Factors such as hormonal imbalance, oxidative stress, environmental toxins, stress, and lifestyle disorders contribute to infertility in both genders. In India, tribal populations rely extensively on plant-based traditional medicine due to limited access to modern healthcare.

Medicinal plants are used as fertility enhancers, aphrodisiacs, and reproductive tonics, especially in ethnomedicinal systems such as Ayurveda, Siddha and folk medicine.

### Definition of Key Terms:

**Fertility Enhancement:** Improvement of reproductive capacity by enhancing gamete quality, hormonal balance, ovulation, spermatogenesis, or implantation.

**Aphrodisiac:** Substances that stimulate sexual desire, libido, or sexual performance, indirectly supporting fertility<sup>9</sup>.

**Reproductive Tonic:** Agents that strengthen reproductive organs and regulate reproductive functions when used regularly.

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The Akola region of Ahilyanagar District represents an unexplored ethnopharmacological area where tribal healers preserve valuable fertility-related medicinal knowledge<sup>10</sup>.

### Materials and Methods:

**Study Area:** The Akola region lies in the semi-arid zone of Ahilyanagar District, Maharashtra, characterized by dry deciduous forests and tribal settlements dependent on forest resources for healthcare.

### Ethnobotanical Survey:

Data were collected through:

1. Semi-structured questionnaires.

2. Interviews with tribal healers, women practitioners and elderly villagers.

3. Documentation of plant parts used, dosage, and preparation methods.

**Plant Identification:** Collected specimens were authenticated using regional floras and standard taxonomic keys. Voucher specimens were preserved for reference.

**Literature Validation:** Pharmacological and phytochemical data were obtained from: Scopus-indexed journals, PubMed, Pharmacognosy and ethnopharmacology reviews.

### RESULTS:

**TABLE 1: FERTILITY-PROMOTING PLANTS USED BY TRIBAL COMMUNITIES OF AKOLA REGION**

S. no.	Botanical Name	Family	Part Used	Traditional Use	Mechanism of Action	Key References
1	<i>Chlorophytum borivillianum</i>	Asparagaceae	Roots	Male fertility tonic	Antioxidant, spermatogenic	Kirtikar & Basu, 2005
2	<i>Asparagus racemosus</i>	Asparagaceae	Roots	Female fertility	Phytoestrogenic, uterine tonic	Nadkarni, 2009
3	<i>Withania somnifera</i>	Solanaceae	Roots	Stress infertility	Adaptogenic, hormonal regulation	Mishra <i>et al.</i> , 2000
4	<i>Tribulus terrestris</i>	Zygophyllaceae	Fruits	Male infertility	Androgen modulation	Adaikan <i>et al.</i> , 2001
5	<i>Mucuna pruriens</i>	Fabaceae	Seeds	Spermatogenesis	Dopaminergic, testosterone enhancement	Shukla <i>et al.</i> , 2007
6	<i>Putranjiva roxburghii</i>	Putranjivaceae	Seeds	Conception aid	Uterine tonic	Kirtikar & Basu, 2005
7	<i>Diplocyclos palmatus</i>	Cucurbitaceae	Seeds	Female infertility	Hormonal balance	Jain, 1991
8	<i>Tinospora cordifolia</i>	Menispermaceae	Stem	Reproductive health	Antioxidant, immunomodulatory	Sharma <i>et al.</i> , 2012
9	<i>Emblica officinalis</i>	Phyllanthaceae	Fruit	Rejuvenation	Antioxidant, Rasayana	Nadkarni, 2009
10	<i>Symplocos racemosa</i>	Symplocaceae	Bark	Menstrual disorders	Anti-inflammatory, estrogenic	Warrier <i>et al.</i> , 1996
11	<i>Butea monosperma</i>	Fabaceae	Seeds	Female health	Hormonal support	Kirtikar & Basu, 2005
12	<i>Saraca asoca</i>	Fabaceae	Bark	Uterine tonic	Estrogenic, endometrial support	Nadkarni, 2009
13	<i>Nigella sativa</i>	Ranunculaceae	Seeds	Hormonal balance	Antioxidant, gonadal protection	Al-Sa'aidi <i>et al.</i> , 2009
14	<i>Trigonella foenum-graecum</i>	Fabaceae	Seeds	Endocrine support	Insulin & hormone modulation	Basch <i>et al.</i> , 2003
15	<i>Zingiber officinale</i>	Zingiberaceae	Rhizome	Aphrodisiac	Testosterone enhancement, antioxidant	Khaki <i>et al.</i> , 2009
16	<i>Curcuma longa</i>	Zingiberaceae	Rhizome	Reproductive health	Antioxidative, anti-inflammatory	Aggarwal <i>et al.</i> , 2007
17	<i>Ocimum sanctum</i>	Lamiaceae	Leaves	Stress infertility	Adaptogenic	Prakash & Gupta,

18	<i>Vigna mungo</i> (L.) Hepper	Fabaceae	Seeds	Aphrodisiac	Spermatogenic, antioxidant	2005 Sharma <i>et al.</i> , 2013
19	<i>Hibiscus rosa- sinensis</i> L.	Malvaceae	Flowers	Ovulation support	Estrogenic	Singh & Singh, 2011
20	<i>Aloe vera</i>	Asphodelaceae	Gel	Hormonal balance	Endocrine modulation	Joseph & Raj, 2010
21	<i>Lepidium sativum</i>	Brassicaceae	Seeds	Fertility tonic	Antioxidant	Ghazanfar, 1994
22	<i>Argyrea nervosa</i>	Convolvulaceae	Seeds	Aphrodisiac	CNS stimulation	Nadkarni, 2009
23	<i>Dactylorhiza hatagirea</i>	Orchidaceae	Tubers	Sexual weakness	Nutritive, spermatogenic	Warrier <i>et al.</i> , 1996
24	<i>Abutilon indicum</i>	Malvaceae	Roots	Uterine tonic	Anti-inflammatory	Jain, 1991
25	<i>Achyranthes aspera</i>	Amaranthaceae	Roots	Menstrual regulation	Hormonal balance	Kirtikar & Basu, 2005
26	<i>Ficus racemosa</i>	Moraceae	Bark	Female disorders	Estrogenic	Nadkarni, 2009
27	<i>Bombax ceiba</i>	Malvaceae	Roots	Aphrodisiac	Spermatogenic	Warrier <i>et al.</i> , 1996
28	<i>Phoenix dactylifera</i>	Arecaceae	Fruits	Seminal strength	Antioxidant	Al-Qarawi <i>et al.</i> , 2005
29	<i>Sesamum indicum</i>	Pedaliaceae	Seeds	Reproductive tonic	Zinc-rich, antioxidant	Bedigian, 2010
30	<i>Cissus quadrangularis</i>	Vitaceae	Stem	Hormonal support	Phytoestrogenic	Jain, 1991
31	<i>Moringa oleifera</i>	Moringaceae	Leaves	Nutritional fertility aid	Antioxidant	Fahey, 2005
32	<i>Piper longum</i>	Piperaceae	Fruits	Aphrodisiac	Bioavailability enhancer	Nadkarni, 2009
33	<i>Allium sativum</i>	Amaryllidaceae	Bulb	Male fertility	Testosterone modulation	Hammami <i>et al.</i> , 2009
34	<i>Crocus sativus</i>	Iridaceae	Stigma	Libido enhancer	Antioxidant	Hosseinzadeh <i>et al.</i> , 2008
35	<i>Terminalia arjuna</i>	Combretaceae	Bark	Vitality tonic	Antioxidant	Kirtikar & Basu, 2005
36	<i>Glycyrrhiza glabra</i>	Fabaceae	Roots	Endocrine balance	Phytoestrogenic	Nadkarni, 2009
37	<i>Aegle marmelos</i>	Rutaceae	Fruit	Reproductive tonic	Anti-inflammatory	Warrier <i>et al.</i> , 1996
38	<i>Bacopa monnieri</i>	Plantaginaceae	Whole plant	Stress infertility	Neuroendocrine regulation	Singh & Dhawan, 1997
39	<i>Sida cordifolia</i>	Malvaceae	Roots	Aphrodisiac	CNS stimulant	Kirtikar & Basu, 2005
40	<i>Calotropis procera</i>	Apocynaceae	Roots	Menstrual disorders	Hormonal modulation	Jain, 1991

### Pharmacological Mechanisms of Action of Fertility-Promoting Medicinal Plants:

The fertility-promoting medicinal plants documented in the present study exert their therapeutic effects through multiple pharmacological mechanisms. These mechanisms act synergistically to improve reproductive health in both males and females. Based on available scientific evidence, the mechanisms can be broadly classified as follows:

**Antioxidant Activity:** Oxidative stress is a major cause of infertility, as excessive free radicals damage sperm DNA, ovarian follicles, and reproductive tissues. Many plants documented in

this study possess strong antioxidant properties that protect reproductive organs from oxidative damage.

Plants such as *Chlorophytum borivillianum*<sup>1</sup>, *Embllica officinalis*<sup>2</sup>, *Tinospora cordifolia*<sup>3</sup>, *Nigella sativa*<sup>4</sup>, *Zingiber officinale*<sup>5</sup>, *Curcuma longa*<sup>6</sup>, *Vigna mungo*<sup>7</sup>, *Lepidium sativum*<sup>8</sup>, and *Phoenix dactylifera*<sup>9</sup> are rich in flavonoids, phenolics, vitamins, and trace elements. These compounds scavenge free radicals, reduce lipid peroxidation, and enhance endogenous antioxidant enzymes, thereby improving sperm quality, oocyte viability, and overall reproductive function.

**Enhancement of Spermatogenesis and Sperm Quality:** Several plants included in the study are traditionally used to enhance male fertility by improving spermatogenesis, sperm count, motility, and morphology. Experimental studies suggest that these plants stimulate testicular function and support the normal development of sperm cells.

Plants such as *Mucuna pruriens*<sup>10</sup>, *Tribulus terrestris*<sup>11</sup>, *Withania somnifera*<sup>12</sup>, *Vigna mungo*<sup>7</sup>, *Allium sativum*<sup>13</sup>, *Bombax ceiba*<sup>14</sup>, and *Dactylorhiza hatagirea*<sup>15</sup> have been reported to increase testosterone levels, activate Sertoli and Leydig cells, and improve semen parameters. These effects contribute to enhanced male reproductive performance.

**Hormonal Modulation and Endocrine Regulation:** Hormonal imbalance is a common factor in both male and female infertility. Many medicinal plants documented in this study act by regulating reproductive hormones through endocrine modulation.

Plants such as *Asparagus racemosus*<sup>16</sup>, *Saraca asoca*<sup>17</sup>, *Symplocos racemosa*<sup>17</sup>, *Hibiscus rosa-sinensis*<sup>18</sup>, *Ficus racemosa*<sup>19</sup>, *Glycyrrhiza glabra*<sup>20</sup>, and *Cissus quadrangularis*<sup>19</sup> contain phytoestrogens and steroid-like compounds. These compounds mimic or regulate estrogen and progesterone activity, helping to normalize menstrual cycles, improve ovulation, and support uterine health.

**Adaptogenic and Anti-Stress Effects:** Stress is a well-recognized cause of infertility, as it disrupts the hypothalamic–pituitary–gonadal axis. Several plants in the present study are known adaptogens that help the body cope with physical and psychological stress.

Plants such as *Withania somnifera*<sup>12</sup>, *Ocimum sanctum*<sup>21</sup>, *Bacopa monnieri*<sup>22</sup>, and *Tinospora cordifolia*<sup>3</sup> reduce cortisol levels, stabilize neuroendocrine function, and improve stress tolerance. By restoring hormonal balance and reducing stress-induced reproductive dysfunction, these plants indirectly enhance fertility.

**Phytoestrogenic and Uterine Tonic Effects:** Female fertility is strongly influenced by uterine health and estrogenic balance. Some plants

documented in this study are traditionally used as uterine tonics and ovulation enhancers.

Plants such as *Asparagus racemosus*<sup>16</sup>, *Saraca asoca*<sup>17</sup>, *Putranjiva roxburghii*<sup>17</sup>, *Abutilon indicum*<sup>19</sup>, and *Symplocos racemosa*<sup>17</sup> strengthen uterine muscles, improve endometrial receptivity, and support implantation. Phytoestrogens present in these plants play a crucial role in maintaining reproductive tissue integrity.

**Improvement of Blood Circulation and Nutritional Support:** Proper blood supply and nutrition are essential for healthy reproductive organs. Several plants contribute indirectly to fertility by improving circulation and providing essential nutrients.

Plants such as *Zingiber officinale*<sup>5</sup>, *Piper longum*<sup>21</sup>, *Sesamum indicum*<sup>23</sup>, *Moringa oleifera*<sup>23</sup>, and *Terminalia arjuna*<sup>23</sup> enhance microcirculation, improve tissue oxygenation, and supply minerals such as zinc, iron, and magnesium. These nutrients are essential for hormone synthesis, gamete development, and reproductive vitality.

**Immunomodulatory and Anti-Inflammatory Effects:** Chronic inflammation and immune dysfunction can impair reproductive health. Some plants included in the study possess immunomodulatory and anti-inflammatory properties that help maintain healthy reproductive tissues.

Plants such as *Tinospora cordifolia*<sup>3</sup>, *Curcuma longa*<sup>6</sup>, *Aegle marmelos*<sup>24</sup>, and *Achyranthes aspera*<sup>25</sup> reduce inflammation and regulate immune responses, thereby creating a favorable environment for conception and pregnancy.

The fertility-promoting medicinal plants documented in this study act through multiple complementary mechanisms, including antioxidant protection, hormonal regulation, stress reduction, enhancement of spermatogenesis, uterine strengthening, and nutritional support. This multi-targeted approach explains the long-standing effectiveness of traditional plant-based therapies in managing infertility.

**RESULTS:** The ethnopharmacognostic survey conducted in the tribal communities of the Akola

region (Ahilyanagar District, Maharashtra) documented 40 medicinal plant species belonging to 29 botanical families, traditionally used for the management of male and female infertility.

Among these, the families Fabaceae, Malvaceae, Zingiberaceae, and Asparagaceae were most frequently represented, indicating their significant role in reproductive healthcare practices. The commonly utilized plant parts included roots, seeds, rhizomes, bark, fruits, leaves, and tubers, with roots and seeds being the most predominant.

Traditional formulations were mainly used as aphrodisiacs, spermatogenic agents, uterine tonics, ovulation enhancers, and stress-relieving remedies. Pharmacological validation from published literature revealed that the fertility-promoting effects of these plants are primarily mediated through antioxidant activity, hormonal modulation, adaptogenic effects, phytoestrogenic action, enhancement of spermatogenesis, and improvement of reproductive organ function.

Notable plants such as *Chlorophytum borivillianum*, *Mucuna pruriens*, *Withania somnifera*, *Asparagus racemosus*, *Zingiber officinale*, and *Vigna mungo* showed strong correlation between traditional claims and experimental evidence, supporting their ethnomedicinal relevance.

**DISCUSSION:** The present study highlights the rich traditional knowledge of fertility-promoting medicinal plants among tribal communities of the Akola region. The dominance of plants with antioxidant and adaptogenic properties suggests that oxidative stress and stress-related hormonal imbalance are perceived as major contributors to infertility in traditional healthcare systems.

Several documented plants such as *Withania somnifera*, *Ocimum sanctum*, and *Bacopa monnieri* are well known for their neuroendocrine regulatory effects, which may help restore hypothalamic-pituitary-gonadal axis function. Similarly, plants like *Tribulus terrestris*, *Mucuna pruriens*, *Vigna mungo*, and *Allium sativum* have been scientifically proven to enhance testosterone levels, sperm count, and sperm motility, validating their traditional use as male fertility enhancers. Female reproductive health is addressed through plants such as *Asparagus racemosus*, *Saraca asoca*, *Symplocos*

*racemosa*, and *Hibiscus rosa-sinensis*, which exhibit phytoestrogenic, uterine tonic, and ovulation-supporting activities. The presence of phytoestrogens and flavonoids in these plants may contribute to menstrual regulation and improved endometrial receptivity.

The convergence of traditional knowledge and pharmacological evidence underscores the therapeutic potential of these plants as safe, cost-effective alternatives or complementary therapies for infertility management. However, further clinical validation, standardization, and toxicity studies are essential to translate this ethnomedicinal knowledge into evidence-based reproductive healthcare interventions.

**CONCLUSION:** This study highlights the importance of traditional medicinal plants in maintaining and improving reproductive health. The practices followed by tribal communities of the Akola region show a deep understanding of natural remedies used to support fertility in both men and women. The medicinal plants recorded in this study are traditionally used to improve hormonal balance, reduce stress, protect reproductive organs, and strengthen overall reproductive function. Such plant-based treatments suggest that fertility is managed in a natural and holistic way rather than by targeting a single cause.

The agreement between traditional knowledge and scientific studies indicates that these plants have good potential for further research. Detailed laboratory studies and clinical trials are needed to confirm their safety, effectiveness, and exact mode of action. Preserving traditional knowledge and medicinal plant resources is essential for future healthcare development. This study provides a useful base for further scientific work and supports the use of traditional medicine as a complementary approach in fertility management.

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**Ethical Statement:** The ethnomedicinal information presented in this study was collected with prior informed consent of the participants. The study did not involve any experiments on humans or animals.

**CONFLICT OF INTEREST:** The author declares no conflict of interest.

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