



# Native Iranian Medicinal Plants and Their Role in Hematopoiesis: A Traditional Medicine Review

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## Abstract

**Background:** Anemia is one of the most prevalent hematologic disorders, affecting individuals across all age groups and remaining a major public health concern. It is characterized by reduced hemoglobin levels or red blood cell counts, resulting in impaired oxygen delivery and diminished physiological function. This review aims to investigate native Iranian medicinal plants traditionally used for hematopoiesis, bridging ancient medical knowledge with contemporary scientific evidence to provide an integrated understanding of their blood-enriching effects.

**Methods:** The review was conducted in two complementary phases. In the first phase, authoritative classical texts and credible online sources of Iranian traditional medicine (ITM) were examined to identify plants historically recognized for their hematopoietic properties. In the second phase, systematic searches were performed across international and national databases, including PubMed, Scopus, Web of Science, SID, and Iranian traditional medicine repositories, using keywords such as "traditional medicine," "medicinal plants," "anemia," and "hematopoiesis" in both English and Persian.

**Results:** A total of 22 native Iranian medicinal plants were identified as hematopoietic agents, including *Vitis vinifera*, *Morus alba*, *Pistacia vera*, *Prunus amygdalus* Batsch, *Cicer arietinum*, *Medicago sativa*, *Ziziphus spina-christi*, *Phoenix dactylifera*, *Daucus carota*, *Apium graveolens*, *Spinacia oleracea*, *Beta vulgaris*, *Ocimum basilicum*, *Allium schoenoprasum*, *Petroselinum crispum*, *Coriandrum sativum*, *Punica granatum*, *Malus domestica*, *Ficus carica*, *Melissa officinalis*, *Alhagi maurorum*, and *Terminalia chebula*. Contemporary pharmacological studies support their traditional uses, revealing mechanisms such as enhanced erythropoiesis, improved iron absorption, and stimulation of hemoglobin synthesis.

**Conclusion:** Native Iranian medicinal plants demonstrate significant hematopoietic potential. They may serve as safe, accessible, and cost-effective alternatives for preventing and treating anemia in both children and adults. Integrating traditional knowledge with modern scientific research provides a strong foundation for developing novel, evidence-based natural therapies that promote hematologic health.

**Keywords** Anemia, Hematopoiesis, Medicinal Plants, Natural Therapy, Public Health, Traditional Iranian Medicine

## Introduction

Chronic diseases, particularly those affecting children such as cancer, anemia, and leukemia, can cause significant physical and emotional

distress (1,2). Among these conditions, anemia stands out as one of the most prevalent hematologic disorders globally. Characterized by a reduction in hemoglobin concentration or red blood

cell count, anemia results in inadequate oxygen delivery to body tissues (3). This condition affects all ages, leading to symptoms like fatigue, weakness, impaired concentration, growth retardation in children, and diminished immune function (2–4). Anemia typically arises from multiple factors, including nutritional deficiencies (iron, folate, and vitamins B6 and B12), chronic illnesses, and hereditary disorders (2,3). Consequently, nutrition plays a pivotal role in both the prevention and management of anemia, as the consumption of nutrient-dense and blood-enriching foods can effectively stimulate erythropoiesis (red blood cell production) and enhance overall vitality (5).

Since ancient times, medicinal plants have been used to prevent and treat anemia (6). Many of these plants are rich in iron, vitamins, flavonoids, and antioxidants that stimulate bone marrow activity, enhance iron absorption, and promote hemoglobin synthesis (7). Specifically, such plants provide essential elements including iron, copper, cobalt, folic acid, and B vitamins necessary for hematopoiesis in the bone marrow (8). Medicinal plants with hematopoietic properties offer a safe, affordable, and accessible alternative to synthetic supplements, often associated with fewer adverse effects (9).

Owing to its vast ecological and climatic diversity, Iran possesses one of the richest floras of medicinal plants in the world (10). Traditionally, these plants have been extensively used in Iranian medicine to strengthen the blood and prevent anemia. Modern pharmacological studies have validated many of these traditional claims. Recent evidence indicates that hematopoietic plants not only stimulate red blood cell production and improve hemostatic balance (11) but may also mitigate the side effects associated with conventional iron therapy, providing a safe and natural approach for the prevention and treatment of anemia (12). Identifying native Iranian medicinal species and elucidating their mechanisms of action can help preserve valuable traditional

knowledge and facilitate the discovery of novel therapeutic agents.

Given the global prevalence of anemia and its significant impact on public health, this review aims to identify and describe native Iranian medicinal plants with hematopoietic properties. By integrating traditional knowledge with modern scientific evidence, the study seeks to underscore the potential of these plants as natural resources for promoting hematologic health.

## Methods

This review was conducted in two sequential phases to integrate traditional knowledge with modern scientific evidence.

### *Phase I – Identification from Traditional Sources*

In the first phase, authoritative texts of Iranian traditional medicine and credible online databases were examined to identify medicinal plants recognized for their hematopoietic properties (13–19). The search focused on plants explicitly described as “blood-enriching” or capable of enhancing blood formation according to classical Persian medical literature.

### *Phase II – Systematic Search of Scientific Databases*

In the second phase, systematic searches were performed in both international and national scientific databases, including PubMed, Scopus, Web of Science, SID, and Magiran, to collect contemporary research evidence regarding the hematopoietic effects of the identified plants. Keywords such as “Traditional Medicine,” “Medicinal Plants,” “Anemia,” and “Hematopoiesis” were used in both English and Persian. The search encompassed studies published up to the end of 2025, restricted to those written in English or Persian.

### *Inclusion Criteria*

Studies were included if they investigated the hematopoietic effects of native Iranian medicinal

plants through laboratory experiments, clinical trials, or validated scientific reports. Eligible studies provided data on parameters such as red blood cell count, hemoglobin concentration, iron absorption, or hemoglobin synthesis. In addition, classical Iranian medical texts describing blood-enriching plants were included to ensure a comprehensive integration of traditional and modern perspectives.

### Exclusion Criteria

Studies were excluded if they focused on non-native or foreign plant species, lacked sufficient or verifiable scientific evidence, were duplicate publications, or discussed unrelated pharmacological effects or adverse reactions with no direct relevance to hematopoiesis.

### Data Extraction and Synthesis

After applying the inclusion and exclusion criteria, relevant data were extracted, including each plant's scientific name, part used, reported hematopoietic effects, and traditional applications. The extracted data were then analyzed and synthesized to provide a comprehensive overview linking traditional ethnomedical insights with modern pharmacological findings on native Iranian hematopoietic plants.

## Results

A review of traditional medicine sources identified several native Iranian medicinal plants historically recognized for their blood-enriching properties, including *Vitis vinifera* L., *Morus alba* L., *Pistacia vera* L., *Prunus amygdalus* Batsch, *Cicer arietinum* L., *Medicago sativa* L., *Ziziphus spina-christi* (L.) Desf., *Phoenix dactylifera* L., *Daucus carota* L., *Apium graveolens* L., *Spinacia oleracea* L., *Beta vulgaris* L., *Ocimum basilicum* L., *Allium schoenoprasum* L., *Petroselinum crispum* (Mill.) Fuss, *Coriandrum sativum* L., *Punica granatum* L., *Malus domestica* Borkh., *Ficus carica* L., *Melissa officinalis* L., *Alhagi maurorum* Medik., and *Terminalia chebula* Retz. Table 1 provides a detailed overview of these plants, including the plant parts used and their traditional modes of administration. Table 1 summarizes the native Iranian medicinal plants included in this review, detailing their scientific classification, plant parts used, and traditional methods of consumption. This overview provides essential context for understanding the sources of hematopoietic activity documented in classical Iranian medicine.

As shown in Table 1, leaves and fruits were the most commonly used plant parts, while infusion or decoction was the predominant method of preparation.

**Table 1** Medicinal Plants Traditionally Used as Hematopoietic Agents

| Plant Name            | Scientific Name                          | Family         | Plant Part Used | Traditional Use             |
|-----------------------|------------------------------------------|----------------|-----------------|-----------------------------|
| Grape                 | <i>Vitis vinifera</i> L.                 | Vitaceae       | Fruit           | Consumed fresh or dried     |
| Mulberry              | <i>Morus alba</i> L.                     | Moraceae       | Fruit           | Eaten fresh or dried        |
| Pistachio             | <i>Pistacia vera</i> L.                  | Anacardiaceae  | Kernel          | Consumed raw or roasted     |
| Almond                | <i>Prunus amygdalus</i> Batsch           | Rosaceae       | Kernel          | Eaten raw                   |
| Chickpea              | <i>Cicer arietinum</i> L.                | Fabaceae       | Seed            | Cooked                      |
| Alfalfa               | <i>Medicago sativa</i> L.                | Fabaceae       | Leaf            | Infusion                    |
| Christ's Thorn Jujube | <i>Ziziphus spina-christi</i> (L.) Desf. | Rhamnaceae     | Leaf, Fruit     | Infusion                    |
| Date                  | <i>Phoenix dactylifera</i> L.            | Arecaceae      | Fruit           | Eaten raw                   |
| Carrot                | <i>Daucus carota</i> L.                  | Apiaceae       | Root            | Juiced or cooked            |
| Celery                | <i>Apium graveolens</i> L.               | Apiaceae       | Stem, Leaf      | Infusion                    |
| Spinach               | <i>Spinacia oleracea</i> L.              | Amaranthaceae  | Leaf            | Cooked, in salad, or juiced |
| Beet                  | <i>Beta vulgaris</i> L.                  | Amaranthaceae  | Leaf            | Cooked or juiced            |
| Basil                 | <i>Ocimum basilicum</i> L.               | Lamiaceae      | Leaf            | Infusion                    |
| Chive                 | <i>Allium schoenoprasum</i> L.           | Amoryllidaceae | Leaf            | Eaten fresh                 |
| Parsley               | <i>Petroselinum crispum</i> (Mill.) Fuss | Apiaceae       | Leaf            | Infusion                    |
| Coriander             | <i>Coriandrum sativum</i> L.             | Apiaceae       | Leaf, Seed      | Infusion                    |
| Pomegranate           | <i>Punica granatum</i> L.                | Lythraceae     | Fruit           | Eaten fresh or juiced       |

|                 |                                 |              |       |                       |
|-----------------|---------------------------------|--------------|-------|-----------------------|
| Apple           | <i>Malus domestica</i> Borkh.   | Rosaceae     | Fruit | Eaten fresh or juiced |
| Fig             | <i>Ficus carica</i> L.          | Moraceae     | Fruit | Eaten fresh or dried  |
| Lemon Balm      | <i>Melissa officinalis</i> L.   | Lamiaceae    | Leaf  | Infusion              |
| Camelthorn      | <i>Alhagi maurorum</i> Medik.   | Fabaceae     | Leaf  | Infusion              |
| Black Myrobalan | <i>Terminalia chebula</i> Retz. | Combretaceae | Fruit | Infusion              |

Other forms of consumption included fresh eating, cooking, juicing, and roasting. These practices reflect the traditional focus on accessible, nutrient-rich plant parts, providing a foundation for their blood-enriching properties as documented in both historical texts and contemporary scientific studies.

In this section, the traditional effects of these medicinal plants are compared with contemporary scientific evidence to assess whether properties described in classical sources are supported by modern research. Table 2 summarizes native Iranian medicinal plants traditionally recognized for their hematopoietic properties, alongside findings from modern studies that confirm their blood-enriching effects or potential to alleviate anemia.

This presentation allows readers to clearly observe both historical uses and scientifically validated mechanisms, highlighting the continuity between traditional knowledge and contemporary pharmacological evidence.

The table below summarizes native Iranian medicinal plants traditionally recognized for their hematopoietic properties, along with modern scientific evidence supporting their effects. These studies illustrate the diverse mechanisms through which these plants promote blood formation, enhance red and white blood cell counts, and confer protection against anemia-related conditions.

As shown in Table 2, most plants exhibit beneficial hematopoietic effects, with several demonstrating dose-dependent activity or protective roles against oxidative and chemically induced hematotoxicity. Notably, while the majority of species enhance red blood cell production and hemoglobin levels, certain plants such as *Medicago sativa* may exert hemolytic effects at high doses, underscoring the importance of appropriate dosing. The integration of traditional knowledge with contemporary scientific evidence provides a comprehensive overview of plants with potential clinical relevance for anemia management.

**Table 2** Modern Evidence of Hematopoietic Effects of Native Medicinal Plants

| Plant Name                                   | Effect on Hematopoiesis / Anemia                    | Ref. |
|----------------------------------------------|-----------------------------------------------------|------|
| Raisin ( <i>Vitis vinifera</i> L.)           | Increases hemoglobin and serum iron                 | 20   |
| Mulberry leaf ( <i>Morus alba</i> L.)        | Exhibits blood-protective effects                   | 21   |
| Pistachio hull ( <i>Pistacia vera</i> L.)    | Improves hematological indices                      | 22   |
| Alfalfa ( <i>Medicago sativa</i> L.)         | Potential hemolytic effects                         | 23   |
| Date seed ( <i>Phoenix dactylifera</i> L.)   | Increases RBC and WBC counts                        | 24   |
| Carrot ( <i>Daucus carota</i> L.)            | Induces apoptosis in leukemia cells                 | 25   |
| Celery leaf ( <i>Apium graveolens</i> L.)    | Dose-dependent increase in blood parameters         | 26   |
| Spinach leaf ( <i>Spinacia oleracea</i> L.)  | Hematopoietic and antioxidant effects               | 27   |
| Beet leaf ( <i>Beta vulgaris</i> L.)         | Dose-dependent improvement in blood counts          | 28   |
| Basil leaf ( <i>Ocimum basilicum</i> L.)     | Exhibits blood-protective effects                   | 29   |
| Leek leaf ( <i>Allium porrum</i> )           | Increases RBC and WBC counts                        | 30   |
| Parsley ( <i>Petroselinum crispum</i> )      | Ameliorates anemia                                  | 31   |
| Parsley + Rutin (RE-CE)                      | Radioprotective effects                             | 32   |
| Pomegranate peel ( <i>Punica granatum</i> )  | Reduces lead-induced hematotoxicity                 | 33   |
| Apple peel ( <i>Malus domestica</i> )        | Enhances prednisolone-induced hematopoietic effects | 34   |
| Sycamore fig leaf ( <i>Ficus sycomorus</i> ) | Dose-dependent increase in blood parameters         | 35   |

## Discussion

Hematopoietic medicinal plants have long been recognized in Iranian traditional medicine as

natural and effective remedies for enhancing blood formation and managing anemia. These plants, rich in essential nutrients such as iron, vitamins, and minerals, support red blood cell

production and elevate hemoglobin concentrations. Their traditional use for treating anemia has been documented for centuries and continues to hold relevance in modern complementary and integrative medicine. For instance, the consumption of raisins (*Vitis vinifera* L.) has been shown to significantly increase hemoglobin and serum iron levels in women, indicating their potential role in alleviating anemia (20). Similarly, pre-treatment with mulberry leaf extract (*Morus alba* L.) improved hematological and biochemical parameters in irradiated mice, suggesting a protective effect against radiation-induced oxidative damage (21). Extracts of pistachio hull (*Pistacia vera* L.), rich in polyphenols, enhanced hematological indices and reduced hepatic tissue injury in anemic animal models, highlighting the therapeutic contribution of antioxidant mechanisms to hematopoiesis (22).

However, not all plant-derived compounds exert uniformly beneficial effects. High doses of alfalfa saponins (*Medicago sativa* L.) were found to reduce red blood cell counts and hematocrit while increasing free hemoglobin levels, potentially leading to intravascular hemolysis (23). Conversely, date seed extract (*Phoenix dactylifera* L.) markedly increased hemoglobin, hematocrit, and red and white blood cell counts in Wistar rats, suggesting its capacity to support bone marrow activity and erythropoiesis (24).

Carrot extract (*Daucus carota* L.) demonstrated selective cytotoxicity against leukemia cells by inducing apoptosis and cell cycle arrest, while minimally affecting normal hematopoietic stem cells—indicating its potential as a source of anti-cancer bioactive compounds (25). Likewise, celery leaf extract (*Apium graveolens* L.) significantly increased hematological parameters in a dose- and time-dependent manner (26). Spinach (*Spinacia oleracea* L.) also improved hemoglobin and hematocrit levels and protected pancreatic tissue, likely due to its antioxidant and nutrient-rich composition (27).

Beetroot leaf extract (*Beta vulgaris* L.) enhanced hematological indices in phenylhydrazine-induced anemia models through its antioxidant and flavonoid constituents (28). Basil (*Ocimum basilicum* L.) protected against benzene-induced hematotoxicity in mice, possibly via compounds such as geraniol and citral that help maintain bone marrow integrity (29). Similarly, leek (*Allium porrum*) increased red and white blood cell counts, platelets, and granulocytes, suggesting immunostimulatory and hematopoietic effects (30).

Parsley (*Petroselinum crispum*), rich in phenolic compounds and iron, reversed phenylhydrazine-induced anemia, confirming its potential role in treating both iron-deficiency and hemolytic anemia (31). Rutin-enriched parsley extract exhibited radioprotective effects by improving survival, enhancing hematopoietic stem cell recovery, and reducing oxidative stress (32). Pomegranate peel extract (*Punica granatum* L.) mitigated lead-induced hematotoxicity by restoring hemoglobin and red blood cell levels, although partial bone marrow suppression persisted (33). Apple peel extract (*Malus domestica*) enhanced the hematopoietic response to low-dose prednisolone, whereas excessive doses diminished this benefit, underscoring the importance of dose optimization (34). Finally, sycamore fig leaf extract (*Ficus sycomorus*) displayed dose-dependent hematopoietic effects, validating its traditional use in the management of anemia (35).

Collectively, these findings confirm that numerous native Iranian medicinal plants exert significant hematopoietic effects through diverse mechanisms, including antioxidant activity, modulation of iron metabolism, and stimulation of erythropoiesis. Integrating traditional ethnomedicinal knowledge with modern pharmacological evidence reinforces the scientific rationale for their continued investigation as safe and effective natural agents in anemia therapy.

## Conclusion

This review highlights the remarkable hemato-poietic potential of native Iranian medicinal plants, including *Vitis vinifera* L., *Morus alba* L., *Pistacia vera* L., *Prunus amygdalus* Batsch, *Cicer arietinum* L., *Medicago sativa* L., *Phoenix dactylifera* L., *Daucus carota* L., *Apium graveolens* L., *Spinacia oleracea* L., *Beta vulgaris* L., *Ocimum basilicum* L., *Allium schoenoprasum* L., *Petroselinum crispum*, *Coriandrum sativum* L., *Punica granatum* L., *Malus domestica* Borkh., *Ficus carica* L., *Melissa officinalis* L., *Alhagi maurorum* Medik., and *Terminalia chebula* Retz.

The most common plant families identified were Apiaceae and Fabaceae, with leaves and fruits being the predominant plant parts used. Traditional preparation methods included decoctions, fresh consumption, and cooking. Contemporary evidence confirms that these plants elevate hemoglobin concentration, increase red and white blood cell counts, enhance iron absorption, and promote hemoglobin synthesis findings that align with their traditional hematopoietic descriptions. The use of these native plants represents a natural, safe, and cost-effective strategy for preventing and managing anemia across diverse populations. Integrating classical Iranian medical knowledge with modern scientific findings provides a robust foundation for developing evidence-based natural therapies aimed at improving hematologic health and reducing the global burden of anemia.

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