

Elixir of Life: Tulsi (*Ocimum sanctum* L.) and occurrence of Powdery Mildew

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ABSTRACT

Background: India has rich diversity of medicinal plants distributed in different geographical and environmental conditions. The traditional medicinal practices are an important part of the primary healthcare system in the developing world. Tulsi (*Ocimum sanctum* L.) is one of the aromatic, perennial plant. It is cultivated for religious and traditional medicine purposes and for its essential oil. Within Ayurveda, Tulsi is known as “Mother medicine of Nature” and is revered as an “Elixir of Life”. **Objective:** Various pathogens like fungi adversely affect the medicinal plant parts and decrease the medicinal value of the part. Powdery mildew disease is become a serious and widespread problem in many parts of India and abroad. **Method:** Powdery mildew fungi were identified by observing symptoms, macroscopic and microscopic characters of infected plant material. **Result:** *Oidium ocimi* grows superficially on leaves of Tulsi plant. At severity of infection causes morphological, anatomical and physiological damages to plants. **Conclusion:** The incidence of this fungal disease on Tulsi plant may causes a setback to the industry associated with the formulation of its medicinal products..

Key words: Tulsi (*Ocimum sanctum*), Powdery Mildew, *Oidium ocimi*, Amravati.

Ocimum sanctum L. of family Lamiaceae (Labiatae), commonly known as Tulsi or Holy Basil; also called as ‘The Queen of Herbs’. It is native to the Indian subcontinent and widespread as a cultivated plant throughout the Southeast Asian tropics [1]. It is widely used in the preparation of herbal tea. It has a holy place within the Vaishnava tradition of Hinduism. Tulsi is a sacred plant for Hindus and traditionally planted in temples and the central courtyard of Hindu houses [2,3].

Daily consumption of Tulsi is said to prevent disease, promote general health, wellbeing and longevity. In addition to health promoting properties, Tulsi is recommended as treatment for a range of conditions including anxiety, cough, asthma, diarrhea, fever, dysentery, arthritis, eye diseases, otalgia, indigestion,

hiccups, vomiting, gastric, cardiac, urino-genital disorders, back pain, skin diseases, ringworm, insect, snake, scorpion bites, malaria, antibacterial and antiviral [4-7].

Powdery mildew fungi belong to order Erysiphales are most common obligate parasites. These fungi produces enormous conidia on the host surface resulting in white powder coating and dusty appearance on the host surface, hence they named as powdery mildew [8]. Blumer and Yearwood recognized only eight genera in Erysiphaceae which are *Sphaerotheca*, *Podosphaera*, *Erysiphe*, *Microsphaera*, *Uncinula*, *Leveillula*, *Phyllactinia*, and *Acrosporium* (= *Oidium*) [9,10]. The losses caused by powdery mildews in India are tremendous particularly in the yield of peas, grapes, cereals and cucurbits [11].

MATERIALS AND METHODS

An extensive survey of powdery mildew diseases on plants during the period 2017-2018 was undertaken. The collected Tulsi samples were packed separately in sterilized polythene bags and noted with their locality, host name, date of collection and brought to laboratory for further investigations. Powdery mildew fungi were identified by observing symptoms, macroscopic and microscopic characters of infected plant material. The leaf scraping method was implemented and slides were prepared by using cotton blue stain and Lacto-phenol as mounting medium. Slides were observed under light microscope and micro-photography was done. Fungal genera was identified on the basis of morphological characters of conidia and conidiophores and by referring standard literature [8,12,13].

RESULTS

Oidium species grown ecto-parasitically on the surface of the Tulsi leaves. The superficial mycelium of the fungi produced enormous number of conidia usually on the leaf surfaces, which appear like mass of white powder (Fig.-1). With the advancement of disease, these powdery masses coalesced to cover the entire leaf lamina. At severity of infection caused leaf drop, chlorosis and stunted the growth of plant. Infection caused morphological, anatomical and physiological damages to plants. Pathogen grew abundantly in dry and cool seasons. Depending upon the environment conditions, this disease caused significant destructions and losses in crop plants and ultimately to the production.



Figure 1- Powdery mildew symptoms on Tulsi leaves

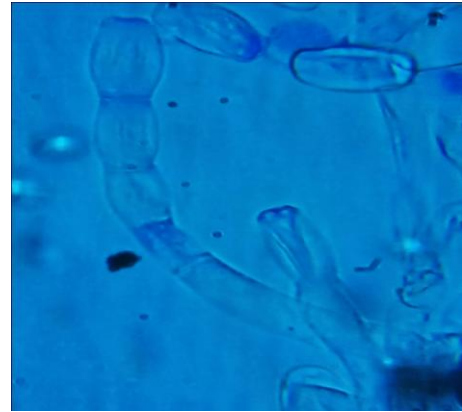


Figure 2- Microphotography showing conidial chain with conidiophore (40x)

Powdery mildew fungi were identified by microscopic analysis of infected plant materials. Slides were observed under high power (40x) and micro-photography was done. Vegetative mycelium is mainly superficial, septate and profusely branched. Conidia are asexual reproductive structure developed on short, unbranched conidiophores. Conidia are successively developed in chains.

Each conidium is barrel to ellipsoid, single-celled and hyaline (Fig.-2). Fungal genera was identified on the basis of morphological characters of conidia and conidiophores and by using standard literature [8,12]. In identification of powdery mildew fungi characters of fruiting body and their appendages play very important role [14]. By considering the microscopic investigation the pathogenic fungus responsible for causing powdery mildew in Tulsi identified as *Oidium ocimi* and supported by Pawar and Patil [15].

DISCUSSION

Many periodical survey were undertaken to study the powdery mildew fungi from different areas of Maharashtra [13-17]. Pawar and Patil reported that 35 wild and medicinal plants were infected by powdery mildew pathogens [15]. The dominant fungus was *Oidium*, which infected 20 plants. During the study of Satara District (M.S.) total 54 host plant species and 7 fungal genera of powdery mildew were reported by Bankar, *et.al.*, [13].

Powdery mildew specially the oidial stages have been reported on several host as *Brassica campestris*,

Argemone maxicana, *Abitulon indicus*, *Triumfetta rotundifolia*, *Clitoria ternatea*, *Bauhinia spe.*, *Tamarindus indica*, *Carica papaya*, *Cassia tora*, *Xanthium strumarium*, *Nyctanthes arbor-tristis*, *Santalum album* from different parts of Japan, India, Australia, USA, Ceylon, West Pakistan, Egypt, Israel, South Africa, USSR, Mauritius, Burma, Mexico, Philippines [18,19,20,21].

Powdery mildews are more common on cultivated plants and grow luxuriantly at low temperature and high humidity. Depending upon environmental conditions the powdery mildew disease may cause significant destruction and loss in plants and yields. With the onset of summer, they began to disappear and plants become free from the infection during scorching heat and rainy season. Changes in biochemical constituents of the plant due to attack of powdery mildew fungi were reported by various workers [22,23,24]. They have reported the decrease in reducing, non-reducing, total sugar contents and observed changes in Amino acid contents.

Medicinal plant should be free from microbial infection in general and fungal infection in particular. In most of the cases fungi infecting the leaves of medicinal plants directly affect photosynthesis by reducing the productivity and formation of secondary metabolites. In addition, the fungal infection also sometimes degrades the quality of medicinally important active principle [25,26,27]. Moreover, the pathogenic microorganism can also produce different types of toxins during pathogenesis, which alter the nature of the active principle leading to serious health hazards instead of curing the diseases.

CONCLUSION

In this study, powdery mildew disease on Tulsi was found in winter and early summer season. The incidence of this fungal disease on Tulsi plant may causes a setback to the industry associated with the formulation of its medicinal products. So, the proper control measure is necessary. To maintain the health and quality of medicinal plants, we can apply the bio-pesticides sprays, which can make the medicinal plants free from infectious fungal diseases like powdery mildews.

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