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### EFFECT OF PANCHA TULSI AGAINST PHOMOPSIS AZADIRACHTAE - THE CAUSATIVE AGENT OF DIE-BACK DISEASE

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#### ABSTRACT

Neem (*Azadirachta indica*) commonly known as 'Indian lilac' or 'Margosa', is a native tree to India. Neem finds very wide application and both wood as well as non-wood products are utilized in many ways. Neem products have antibacterial, antifungal, insecticidal and other versatile biological activities<sup>1</sup>. However, neem is not free from microbial diseases though having biological activity against various microorganisms. Many bacteria and fungi are known to infect neem<sup>1</sup>. A new fungus *Phomopsis azadirachtae* was reported on neem causing dieback. The fungus infects the neem trees of all age and size. Twigs blight and fruit rot of *Azadirachta indica* (Neem) infected with dieback disease<sup>2</sup>, collected from different regions of Medchal, Malkajgiri district, India were analysed to determine the pathogens. The aim of this study was to evaluate the antifungal activity of Pancha tulasi essential oil on the growth of *Phomopsis azadirachtae* isolated from die-back infected neem twigs and fruit rot. The fungus affects leaves, twigs and inflorescence, irrespective of age, size and height of the tree. Apart from fruit rot, it causes twigs blight in neem. Study reveals the control the 'Die-back' disease is to mix one gram of 'Bavistin' powder in seven/eight litres of water. This could be sprayed on the neem trees after the rainy season. After treating with chemical agents such as Thiophanate (ROKO), Profenofos (Profex) is an organophosphate insecticide, we started spraying Pancha tulasi (aromatic oils)- 5 ml in 10 litres of water for the 7 days to sustain the recovery. The disease results in almost 100% loss of fruit production.

**Keywords:** *Azadirachta indica*, *Phomopsis azadirachtae*, dieback disease, Bavistin, Thiophanate (ROKO), Profenofos (Profex), Pancha tulasi.

#### INTRODUCTION

Neem (*Azadirachta indica*) is an evergreen deciduous tree. It is commonly called "Indian lilac" or "Margosa" and belongs to the Mahogany family Meliaceae<sup>3</sup>. It is native to Indian sub-continent. The Persian name of the neem is Azad-Darakht-E-Hind, which means 'free tree of India'<sup>4</sup>. Over 20 million trees are found all over India. It is referred as "Tree for solving global problems". Ayurveda regards the tree as a Sarva roga nivarini<sup>5</sup>. Neem tree is also known for its medicinal properties and is a vital ingredient in the production of fungicides and insecticides, effective against a wide array of pathogens. But today it is

ironically under attack by a fungus. In the severely infected trees, there is a loss of flowers and fruit.

Pancha Tulsi is an Ayurvedic preparation of five different kinds of tulsi. They all together work to boost the immunity, skin care and overall health care for a body<sup>7-8</sup>.

- *Marua Tulsi*, also known as Marjoram and Origanum majorana. Marua tulsi benefits as a tonic for nerve, heart, chronic cold and cough. It may also be helpful for asthma patients<sup>9</sup>.
- *Kala Tulsi*, also known as Krishna Tulsi (*Ocimum sanctum*). It's a purple tulsi that's one of a kind. It is used for throat pain and infection, nasal problem, skin problem, ear-ache and the complete respiratory system<sup>10</sup>.

- *Rama Tulsi*, also known as *Ocimum tenuiflorum* in scientific name. It is the most famous kind of tulsi and is used for cooling effect in the body. It is good to drink rama tea or drops for better immunity, fight free radicals, skin problems and many more<sup>11</sup>.
- *Nimbu Tulsi*, also known as *Ocimum Citriodorum*. It has an antimicrobial effect, antioxidants that work to prevent bacterial growth, support immunity, and reduce the

stress level in the body. Experience nimbu tulsi benefits to the body<sup>12</sup>.

- *Biswa Tulsi*, a rare kind of tulsi and is used in cholesterol level and immunity-boosting<sup>13</sup>.

All kinds of tulsi have a stronger scent with a mint-like refreshing sensation in a spicy stimulus. It is healthy to add tulsi to your daily life. In addition, the scent component "linalool" is said to have the effect of relaxing the mind and relieving anxiety and stress<sup>14-15</sup>.



**Fig 1: Pancha Tulsi**

### *Phomopsis Azadirachtae*

In spite of its well-known antifungal and antibacterial and other versatile biological activities, neem is not free from microbial diseases. Many fungal and bacterial pathogens were reported on it. Die-back of neem is caused by *Phomopsis azadirachtae* Sateesh, Bhat & Devaki<sup>16-18</sup>. The fungus affects leaves, twigs and inflorescence, irrespective of age, size and height of the tree. Although the neem tree is affected by several microorganisms, *Phomopsis azadirachtae* is the most dangerous of all. The disease changes the leaf colour to pale green or yellow, scorches the leaf margins and reduces the growth of twigs and stem<sup>19-20</sup>.

## MATERIALS AND METHODS

Pancha Tulasi Liquid is loaded with the goodness of 5 types of Tulasi. Tulasi is a powerful herb that possesses immunity-boosting properties and also helps to fight against common infections. The Pancha Tulasi is purchased from the Apollo Pharmacy which is manufactured by Deltas Pharma Pvt Ltd and fungicides.

### Management

- Because neem trees of all shapes, sizes, and ages are susceptible to dieback disease, which is brought on by the widespread phytopathogenic fungus *Phomopsis azadirachtae*. It also causes twig blight in neem, in addition to fruit rot.
- We selected all age group of infected neem (Total -25) in rural areas of the Medchal malkajgiri district for the treatment during November- January 2021 and divided into two groups. Group 1 received fungicide and other received aromatic oils.
- Bavistin<sup>21</sup> is a systemic fungicide which controls disease at every growing point of plant. The solution to control the 'Dieback' disease is to mix one gram of

'Bavistin' powder in seven/eight litres of water. This could be sprayed on the neem trees after the rainy season. Bavistin was found as most effective, which completely suppressed mycelial growth, sporulation and conidial germination of the deadly pathogen. Thiophanate<sup>22</sup> (ROKO) which is broad spectrum systemic fungicide and has a unique combination of preventive, curative and systemic fungicidal properties. After seven days of Bavistin spray, Mix Thiophanate that is 2gms in 1Litre of water and sprayed at base of tree. Profenofos<sup>23</sup> (Profex) is an organophosphate insecticide, it works by potent inhibition of the enzyme acetylcholinesterase, After Twenty days of Bavistin Spray, Mix Profenofos that is 3ml in 1Litre of water and sprayed at base of stem.

- Pancha tulasi (aromatic oils) sprayed to the trees- 5 ml in 10 litres of water for the 7 days to sustain the recovery and compared with the first group. Literature suggested other aromatic oils found to contain the infection are given in below for the reference.

## RESULTS AND DISCUSSION

The present study suggests that Pancha tulasi aromatic oils tested possess antifungal potential under laboratory conditions and could be used for the eco-friendly management of *P. azadirachtae*. However, this is a preliminary investigation to know the potential of some aromatic oils against fungi. Further study is warranted to know the active compounds present in these oils and their mode of action. The results obtained from this study will form a basis for further investigations in this regard.

This study indicated that plant oils possess antifungal activity and can be exploited as an ideal treatment for future plant disease management programs eliminating the fungal spread. Oils contain a high percentage of monoterpenes, eugenol, cinnamic aldehyde, thymol, terpenes and phenolic compounds and these can inhibit microorganisms by various

mechanisms such as affecting the activities of membrane catalyzed enzymes, acting as uncoupling agents and interrupting ADP phosphorylation, interfering with membrane-integrated or associated enzymes by stopping their production or activity. Oils also inhibit the synthesis of DNA, RNA, proteins and polysaccharides in fungal and bacterial cells. In fungi, they act on hyphae, causing loss of rigidity and integrity of the cellular wall of the hyphae, resulting in the death of mycelium. The inhibition of fungal growth observed in the present study with the Pancha tulasi may be attributed to some of the microbicidal and fungitoxic effects mentioned above.

## CONCLUSION

We observed significant improvement against neem's die

back disease during 3 month of our study and showed the best results across the selected trees. The present study suggests that pancha tulasi oil possess an antifungal potential under laboratory conditions and could be used for the eco-friendly management of *P. azadirachtae*. However, this is a preliminary investigation to know the potential of oils against fungi. Further study is warranted to know the active compounds present in these oils and their mode of action. The results obtained from this study will form a basis for further investigations in this regard.

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