



# Application of Botanicals

## An eco - friendly approach for plant disease management

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### Botanical pesticides in plant disease management

Synthetic fungicides and pesticides have been used carelessly, resulting in a variety of environmental and toxicological issues for human health. Although synthetic fungicides applied in the field may not always be preferred, chemical management of the majority of plant fungal infections may be possible and might significantly lessen the impact of plant diseases. However, they are not only expensive but also dangerous to the environment and human health anywhere in the globe, and they may cause pathogenic fungus to become resistant to ordinary

fungicides. Botanical pesticides are organic plant chemicals that have been used to control pathogenic bacteria that affect both plants and people. Recently, attention has been focused on using higher plant products as innovative chemotherapeutics in plant protection in many parts of the world. Botanical pesticides are once more becoming more and more popular, and some plant products are being employed as green insecticides on a global scale. It is becoming increasingly important to replace the excessive use of pesticides with bio-control agents and botanicals. Plant-based

goods are inexpensive, cost-effective, and readily biodegradable. This makes them a

suitable alternative to synthetic fungicides for the treatment of plant diseases.

### Botanical

Botanical pesticides are disease-eradicators made from plant extracts. These plant elements are poisonous to diseases. Natural, effective, economical, and biodegradable botanical insecticides are available. Because

they degrade into harmless molecules within hours or days in the presence of sunshine, these are safer for both the user and the environment.

**Table No. 1 Sources of Botanicals and their antimicrobial activity**

Common name	Scientific name	Plant Part used	Disease/ Pathogen
<b>Datura</b>	<i>D. stamonium</i>	Root, stem, Leaf, flowers	<i>Curvularia lunata</i>
<b>Turmeric</b>	<i>Curcuma longa</i> Linn.	Rhizome	<i>Phytophthora infestans</i> , <i>Fusarium solani</i> , <i>Pyricularia oryzae</i>
<b>Neem/Margosa</b>	<i>Azadirachta indica</i>	Leaf, Stem Bark, root	Anthracnose of pepper
<b>Neem/Margosa</b>	<i>Azadirachta indica</i>	Seed kernel	<i>A. alternata</i>
<b>Garlic</b>	<i>Allium sativum</i> Linn.	Bulb, Leaf	<i>Curvularia lunata</i>
<b>Neem/Margosa</b>	<i>Azadirachta indica</i>	Seed, Leaf	Early blight of tomato
<b>Neem/Margosa</b>	<i>Azadirachta indica</i>	Leaf	Sheath blight of rice
<b>Strawberry</b>	<i>Fragaria</i> spp.	Fruit	Anthracnose of strawberry
<b>Black pepper</b>	<i>Piper nigrum</i> Linn.	Leaf	Anti-bacterial (gram-positive and gram-negative)
<b>Indian aloe Tobacco</b>	<i>Aloe barbadensis</i> Mill. <i>Nicotiana tabacum</i> Linn.	Leaf	Dry rot of yam <i>F.oxysporum</i> , <i>A. nizer</i>

### Method of Application:

#### 1. Seed and Seedling Treatment

The goal of seed and seedling treatments is to eradicate the mycoflora that cause seed decays and seedling blights while also defending the germination of the seed from pathogens that live in the soil. Through the years, the advantages of treating seeds and seedlings have been clearly documented. Seed treatment with 5% leaves extracts of neem, marigold and garlic bulb extract significantly reduces the wilt disease complex (*Rhizoctonia solani*, *Fusarium oxysporum*, *Sclerotium rolfsii* (*Corticium rolfsii*) and *Macrophomina phaseolina*) in

lentil. Seed soaking in aqueous extracts of neem seeds reduces penetration by *Meloidogyne incognita*. The reduction is directly proportional to the concentration and soaking time.

#### 2. Foliar Application

The most often used pest management technique is the application or spraying of chemicals on foliage. Neem product pre-inoculation spray prevents leaf spots, rusts, mildews, rot diseases, and moulds. Spraying of crude leaf extract of *Azadirachta indica* was most potent in reducing bean common mosaic virus

infectivity under field conditions. Similarly, neem seed extract and neem oil can be used for the management of leaf spot of ground nut, caused by *Mycosphaerella arachidis*.

### 3. Soil Application

Numerous plant pathogens are found in soil. It is well known that soil serves as the major inoculum for many plant diseases. One of the most efficient ways to control numerous soil-borne plant diseases is by soil amendment using botanicals. Several findings support that use of organic amendments like, neem, groundnut, castor, cotton, mustard and safflower cakes reduced the inoculum levels of *Macrophomina phaseolina* and *Fusarium*

*moniliforme* (*Gibberella fujikuroi*) in the soil, and subsequently reduced the incidence of stalk rot of sorghum.

### 4. Post harvest application of botanicals

The most common point of introduction for invasive infections is wounds caused during fruit handling and harvesting. By using botanical pesticides after harvest, fruits and vegetables can be shielded from diseases that invade wounds. There are numerous secondary metabolites that plants create that have antibacterial effects on pathogens after harvest. With positive results, thorough studies on aromatic compounds, essential oils, volatile chemicals, and isothiocyanates have been carried out.

#### Advantages of botanicals

1. Sustainable in agriculture
2. Eco-friendly in nature
3. A tool of organic farming
4. Easily bio-degradable
5. Cheaper as compare to chemical application
6. A tool of integrated plant disease management

#### Disadvantages of botanicals

1. Extraction methods are not properly standardized
2. Rapidly degradable
3. Most of the studies are for in-vitro efficacy
4. Need of development of proper formulation
5. Some of the chemical compounds are harmful for human and animals
6. Less effective as compare to chemical application.

#### Conclusion

The pesticidal properties of tobacco were known in the 19th century. Indian farmers have been using neem trees for their pesticide properties for 100 years. Therefore, botanicals offer an alternative to chemical disease control for plants. When plants are collected from the wild, there is a risk of genetic erosion even though botanical pesticides can be found nearby. Botanicals' toxicological and environmental characteristics must be understood and taken into account. The mere fact that a substance comes from a natural source does not guarantee its safety. Natural products, many

of which are derived from plants, are the known sources of the most lethal mammalian poison. Despite all obstacles, the study supports the use of botanical pesticides, particularly given the rising popularity of organic food consumption and awareness of the negative effects of synthetic pesticides. Effective partnerships with pharmacologists, plant pathologists, and microbiologists are essential to see the full development of such an exploitable product since the application of botanical pesticides is one such strategy that fits well with IDM strategies to attain and ensure good crop health.