



## Major Onion Diseases, Nutritional Deficiency, Disorder of Onion and their Management

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### Abstract

Onions is the most cultivated forms of the family Alliaceae and consumed by almost every culture on earth. Onions are second only to tomatoes in value of vegetable crops cultivated worldwide. There are a number of pathogens attack onions and garlic throughout their developmental stages since the developmental process is important in the progression of diseases. Onions are normally propagated from seed, planted directly into the field, although onion sets and transplants are also used. This article covers disease management of many of the major bacterial, viral and fungal diseases of onions with an emphasis on those diseases that have been the topic of disease management research or for which effective disease management systems have been put into practice. In order to help in the identification of particular diseases, short descriptions of the pathogens and symptoms are presented.

### Introduction

Onion (*Allium cepa* L.) is an important tuber crop and an indispensable part of vegetable preparation. Onion has been cultivated in India for the last 5000 years, mainly in tropical climates. Onion is an important vegetable and spice crop; Protein and some vitamins are also present in small amounts in it. Many medicinal properties are found in onion. Onion is used as soup, pickle and salad. In India, onion cultivation is significant, with the country ranking first in terms of cultivation area and second in production, following China. However, India's onion productivity is comparatively low compared to major producers like China, the USA, and the Netherlands. To enhance productivity, it is crucial to grow high-yielding onion varieties that are resistant to diseases. Some of the major onion-producing states in India include Maharashtra, Gujarat, Madhya Pradesh, Uttar Pradesh, Odisha, Karnataka, Tamil Nadu, Andhra Pradesh, and Bihar. These regions provide favourable conditions for onion cultivation.

### Diseases of onion crop

1) **Damping off:** This disease is caused by a fungus called *Sclerotium rolfsii*. This affects the growth time of plants after seed germination in the nursery. The filaments of the fungus affect the plants by entering from the ground part of the plants. Due to which the plants start turning yellow. The part of the plant that touches the ground starts rotting. And then the plants start drying up. Continuous growing of saplings at the same place increases the incidence of the disease. Even after transplanting, the spread of this disease in the fields is on a large scale. In *Kharif* season, the environment is suitable for the spread of this disease.

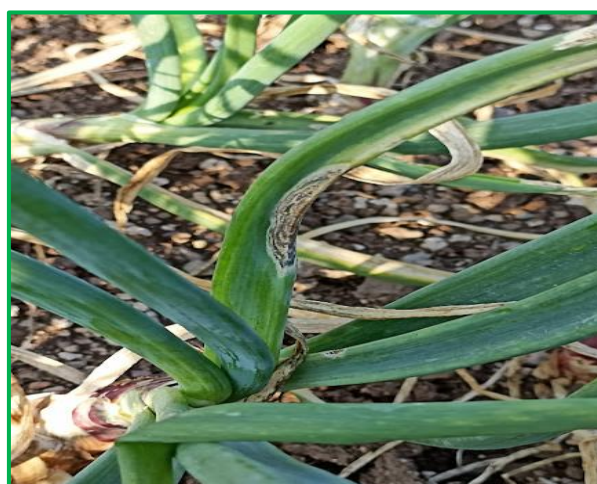
More moisture and 24-30<sup>0</sup>C temperature are suitable for the growth of this fungus. If the drainage is not good in the field, then the outbreak of this disease is more.

- Before sowing the seed should be treated with Thiram and Captan (4 grams per kg. seed).
- Seeds should be treated with Trichoderma viridis at the rate of 4 grams per kg.
- Soil solarization: Expose the soil to high temperatures by covering it with transparent plastic sheets during hot summer months to reduce the fungal population in the soil.
- Drenching of nursery bed in case of disease outbreak Captan and Thiram @0. 2% and Carbendazim @0. 1% and Copper Oxychloride @ 0.3% per liter



**2) Anthracnose:** In the state of Maharashtra, the outbreak of this disease is more in *Kharif* season. This disease is caused by a fungus called *Colletotrichum gliosporoides*. At the beginning of the disease, ash-colored spots are formed on the outer part of the leaves in the part attached to the ground. Which later increase in length and black spots appear on the entire leaves. These bulges are circular. The affected leaves wither, curl and eventually dry up. Due to continuous drying of leaves one after the other, the growth of tuber does not take place. In the *Kharif* season, this disease grows quickly in an environment with high humidity and the germs reach from one plant to another through raindrops. Similarly, this disease also reaches the fields from the nursery. The outbreak of this disease increases in conditions like water logging, moist environment, drizzling rain or cloudy weather in the sky. During the growth of the crop, due to the outbreak of this disease, the leaves start drying up and tubers are not formed.

- Before transplanting, the roots of plants should be dipped in 0.2% solution of Carbendazim.
- Use well decomposed organic manure
- Treat soil with Benomyl @ 0.2%
- Raised beds should be made for nursery.
- Spray fungicides of Mancozeb @ 0.25% / Tricyclazole @ 0.1% / Hexaconazole @ 0.1% / Propiconazole @ 0.1% at an interval of 8-15 days after 30 days of transplanting or as soon as the disease appears.
- Drenching with Copper Oxychloride @ 3-5 gm/Litre



**3) Purple blotch:** This disease is caused by a fungus called *Alternaria porin*. This disease causes large scale losses in all the onion growing countries in the world. This disease can occur at any stage of the plants. In this disease, initially small, depressed, vertical white spots with purple centre are formed on the stems of the leaves or flower clusters. These spots start

growing slowly and initially the spots are purple which later turn black, many such spots grow together and the leaves turn yellow and dry up. Plants become soft and weak from the neck. The stalks of flowers also bend and fall. This disease can cause 50 to 70% loss.

There is more outbreak of this disease in *Kharif* season. The disease also occurs in nursery and post-planting crops and seed production crops. 18 to 200 cm Temperature and humidity above 80% favor the development of the disease. This disease is also affected in favorable environment in late *Kharif* crop.

- Crop rotation with non-host crops
- Good drainage and recommended dosage of Natra Sphurad Palash fertilizers
- Fungicide, Mancozeb @ 0.25% / Tricyclazole @ 0.1% / Hexaconazole @ 0.1% / Propiconazole @ 0.1% / Metiram 55% + Pyraclostrobin 5% WG @ 0.2% / Azoxystrobin 18.2% + Difenconazole 11.4% SC @ 0.125% at 10-15 Spray after 30 days of transplanting or at an interval of days as soon as the disease appears.

**4) Stemphylium blight:** This disease is caused by a fungus called *Stemphylium vesicarium*. This disease has a bad effect on tubers and seed crops. In this disease, elongated yellow-orange-coloured spots are formed on one side of the leaves or flower buds. Soon their size starts increasing and the leaves dry up. Due to its outbreak in the seed crop, the flower stalks become weak and bend and fall. This disease has been found to be more prevalent mainly in *rabi* season. 15 to 200 cm. The disease spreads rapidly in temperature and 80 to 90% humidity. The outbreak of the disease is more due to rain and cloudy environment in the month of February-March. In North India, its outbreak is more due to this type of environment in *Rabi* season. The disease progresses rapidly due to rain during winter. Due to this, 80 to 90 percent damage has been found to the seed crop in North India.

- Use drip irrigation method to avoid pathogen spread and disease outbreak
- Fungicides, Mancozeb @ 0.25% / Tricyclazole @ 0.1% / Hexaconazole @ 0.1% / Propiconazole @ 0.1% / Metiram 55% + Pyraclostrobin 5% WG @ 0.2% / Azoxystrobin 18.2% + Difenconazole 11.4% SC @ 0.125% 30 days after transplanting After that spray fungicide at an interval of 10-15 days.
- Adhesive material (sticker) must be added to it. Simultaneous spraying by farmers of the same area can give good control of the disease.

#### Viral disease

**1) Onion yellow dwarf:** This viral disease affects crops like onion, leek, garlic etc. In this, onion plants remain dwarf. The leaves get flattened and curled up. The intensity of yellowing in the leaves starts with mild yellowing and gradually the entire leaf turns yellow. The flower buds remain thin and yellowness comes on them too.

The spread of this virus is done by insects called Mahu.

- Foliar spray of insecticides like Profenophos (0.1%), Carbosulfan (0.2%) or Fifronil (0.1%) depending on the severity of infestation to control aphids
- Diseased plants should be uprooted and destroyed.



**2) Aster yellow:** This disease is caused by mycoplasma. The disease starts from the base of young leaves. Green stripes appear on the leaves. This yellowing progresses from the base of the leaves towards the upper tips. The flower stalks become thin and less in number. The flower clusters do not fill completely and remain small. Pedicels of some flowers in the inflorescence become long and the flowers do not remain of the same length.

- This disease is spread by sap sucking insects. Control of these insects is essential to prevent the spread of the disease.
- Plant high quality seedlings free from thrips and iris yellow spot virus.
- Diseased plants and tubers should be immediately removed and destroyed. Seed-borne spread can be prevented by removing and destroying affected plants in seed crops.

**3) Irish yellow spot:** Yellow vertical square-shaped spots fall on the leaves and flower stalks. Because of this, the flower buds start falling from the affected part and seeds are not formed on them or they are very weak. This disease is spread by thrips. Its outbreak occurs on a large scale on *rabi* onion and mainly on seed crops.

- To avoid this disease, along with planting the crop, proper protection from thrips is the main solution. Apart from this, this disease can also be controlled to some extent by adopting crop rotation.
- Remove volunteers, buds and weeds in and around onion fields.

### Pest control in onions

**1) Thrips tabaci:** These insects are 1-2 mm in size, which is modest. There are long, velvety insects that are either bright yellow or white-brown in colour. They have hundreds of juice-sucking mouthpieces that are concealed inside the cupolas of plant leaves. This insect's nymph and adult stages both harm the delicate leaves by draining the sap. The pest-affected leaves develop white patches.

- Two hours before to transplantation, dip the onion seedlings in a 0.2% carbosulfan solution.
- Depending on the severity of the illness, 2-4 foliar sprays using pesticides such as Profenophos (0.1%), Carbosulfan (0.2%), or Fifronil (0.1%) at intervals of 10–15 days are recommended.
- Sticker should say to apply to leaves at 0.5 ml/Litre.

**2) Cut worm:** The caterpillars of this insect harm the plants. These snakes are 30-35 mm. It is long and ash coloured. It nibbles on the underground parts of plants. Due to which the plants start turning yellow and get uprooted easily when uprooted. There is more outbreak of this worm in pebble, sandy or light soils.

- The previous crop's remnants should be burned.
- Onion crop should not be taken after potato.
- Crop rotation should be done properly.
- Pheromone traps @ 12–15/ha are an option. It is suggested that you mount the trap on a support rod one foot above the plant canopy. A new lure needs to be used every two to three weeks (regular intervals).
- To monitor and mass-trap adult moths, light traps at a rate of 3-5 traps/ha should be positioned 15 cm above the crop canopy.
- For *S. exigua* Onion, chlorantraniliprole 18.5% SC at 0.15 ml/l, spinosad 45% SC at 0.12 ml/l, chlorpyrifos at 2 ml/l, quinalphos at 1.2 ml/l, and NSKE 5% spray were also found to be effective.

**3) Mites:** It is a major pest of the crop and its maggots are given in the stem near the ground of the plants. The number of maggots can range from about 2-4. Due to this, the part of the stem near the ground gets destroyed and the whole plant dries up. Sometimes the crop is heavily damaged by this pest.

- Avoid continuous onion cropping
- As soon as the symptoms appear in the field, spray Dicofol (2 ml./Litre). If necessary, repeat spray after 10 days.
- Spray sulfur on the leaves at the rate of 0.5 grams per liter

## Nutritional deficiency, disorder of onion

Any crop must be fertilized in a balanced way in order to produce its optimum yield potential. On empirical research, current fertilizer recommendations for onions. The majority of farmers apply all fertilizer nutrients as a base application at the time of transplanting without taking crop nutrient removal into account. Additionally, secondary and micronutrients are hardly used. Sustainable production requires the replenishment of nutrients lost by agricultural plants through the use of chemical fertilizers and organic manures.

**1) Nitrogen:** signs of a nitrogen deficit leaves become upright, curled, and yellowish-green. Wilted and dwarfed, the tissue above the bulbs softens with age. Foliar spraying with urea 1% or DAP 2% twice a week is a control measure.

**2) Phosphorus:** Slow growth, blazing maturity, light green leaves, and little dry outer peels on the bulb. Burn on elder leaves, tip. Control strategy when sowing or planting, the necessary amount of phosphorus should be provided to the soil. Foliar spray of DAP 2% twice at fortnight intervals.

**3) Potassium:** In cases of severe insufficiency, indications of potassium inadequacy only appear on young leaves. Older leaves get yellow and necrotic, and the tip burn symptoms cause the leaves to turn dark green and upright. Potassium @ 1% foliar spray twice weekly as a control measure.

**4) Sulphur:** The yellowing is considerably more consistent over the entire plant, including the young leaves, and the leaves exhibit a generalised overall chlorosis. Spraying potassium sulphate on leaves twice, separated by a fortnight, is a control measure.

**5) Manganese:** Leaves are light-colored, curled, and displaying tip burn. With thick necks and restricted growth, bulbing takes longer. Foliar spray on manganese sulphate ( $MnSO_4$ ) @ 0.3% twice at fortnightly intervals is a control measure.

**6) Zinc:** In the early stages of zinc shortage, the leaves exhibit internal necrosis. Younger leaves turn yellow, and the inside upper surface of adult leaves begins to develop pitting. Spraying zinc sulphate ( $ZnSO_4$ ) foliarly twice every two weeks is a control measure.

**7) Iron:** The most typical sign of an iron deficit is internal chlorosis in young leaves, which is a complete yellowing of the leaves. Develops into a complete chlorosis and terminates with a completely bleached leaf. Young leaves show the first signs of iron shortage. Foliar application of ferrous sulphate ( $FeSO_4$ ) at 0.5% is a control measure.

## Conclusion

By implementing effective disease management practices and adopting modern agricultural techniques, farmers can cultivate a successful onion crop, leading to a profitable market outcome.

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