

Smudge Disease: A Post-Harvest Challenge in White Onion

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Onion Smudge disease caused by the fungus *Colletotrichum circinans* (Berk.) Voglino. Affects outer dry scales of onion bulbs. Although it is not considered highly destructive, smudge reduces visual appeal and market quality in high-value onions. The disease starts a few days before the onion harvesting, and its intensity increases in storage when humidity and temperature fluctuations promote disease development. Smudge is of economic concern in fresh market onions and export consignments, where an attractive bulb appearance is critical quality parameter. The disease most prevalent on white onion varieties due to the presence of phenolic compounds catechoic and protocatechoic acid, which favor the development of *C. circinans*. These compounds create a more conducive environment for fungal colonization, making white onions more susceptible than colored varieties. As a result, smudge infection causes notable spots on the bulbs surface, significantly affecting the visual appearance thereby reducing the market and export values of the crop. This susceptibility highlights the need for careful pre-harvest management and proper post-harvest handling to minimize economic losses.

Symptoms

- ❖ It is confined for the most part to the bulbs small, green, or black spots appear on the outer scales of the onion
- ❖ The size of these spots increases to 1 inch in diameter
- ❖ Small yellow lesions develop on the inner bulb as the pathogen progresses through outer scales. Infection usually begins in the field and symptoms worsen during storage
- ❖ The spots may be homogeneous in appearance or may consist of numerous individual stromata scattered miscellaneously or arranged in concentric rings.
- ❖ Sometimes black molds are seen spreading along the path of the veins of the scales
- ❖ Produces dark blotches; losses are more economic than volumetric.



Figure: Symptoms of smudge caused by *Colletotrichum circinans*

Favourable conditions and spread

- ❖ The fungus persists in the soil and remains on onion leaves, serving as an inoculum source for the next cropping season.
- ❖ Moist conditions and soil temperatures above 20°C are best for rapid development of the disease.
- ❖ Humid weather also plays key role in fungus spore germination.
- ❖ Spread of the fungus occurs when spores, either on the outside surface of the bulbs or as infections of the scale leaves, are moved in wind-blown rain. Disease spreads via wind-blown spores from infected leaf surfaces, bulbs, or scale leaves

Management

No satisfactory controls are available for white onions; therefore, coloured varieties should be used where smudge is a persistent problem.

Cultural Practices

- ❖ Crop rotation, use of seed or healthy sets, proper drainage and a good foliage fungicide program helps for onion smudge management.
- ❖ The crop should be harvested promptly; exposure to rain should be avoided between harvest time and storage.
- ❖ Cultivation of onion varieties with well-developed outer scales, as these are more resistant to infection
- ❖ Cure bulbs thoroughly before storage, ensuring outer scales are completely dry.
- ❖ Harvest only at physiological maturity; avoid harvesting during wet spells.

Chemical Control

- ❖ Although smudge is largely cosmetic, pre-storage dips in thiophanate-methyl or chlorothalonil or mancozeb have shown efficacy in reducing incidence

Biocontrol and Storage

- ❖ Sanitize storage structures before loading with formaldehyde (2%) or potassium permanganate.
 - ❖ Avoid overstacking and allow adequate airflow between bulb layers.
 - ❖ It is beneficial to give sulfur smoke in the onion storage houses
 - ❖ Limited studies suggest dusting with *Trichoderma* powder and neem oil sprays in reducing surface spore viability.
 - ❖ Dusting Talc / Ash powder or talc powder with neem oil - absorbs moisture and reduces disease

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