**Bioscience Discovery**, 16(4a):01-04, October – 2025

Open Access, Peer Reviewed, Referred Research Journal

**Print & Online available on** https://jbsd.in

ISSN: 2229-3469 (Print); ISSN: 2231-024X (Online)

***Research Article***


# Occurrence of Fungi *Albugo* Species and Its Bio mechanisms changes

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**Article Info**

Received: 07-09-2025,
Revised: 28-10-2025,
Accepted: 17-11-2025

**Keywords:** White rust fungi, biochemical, common name, crop leaves

**Abstract**

Impact of *Albugo* white rust on qualitative Analysis of Amino Acids, estimation of minerals that is calcium and phosphorus of the infected leaf was found to be decreased due to white rust. The amino acid content was significantly changed because of disruption in the metabolism of plant organs under influence of a pathogen.

## INTRODUCTION

Fungi of *Albugo* is a family Albuginaceae commonly known as **White rusts** comprising a single genus *Albugo* having 35 species and about 25 varieties.All the species are obligate parasites o flowering plants. White rust or stagheads are caused by several species of the fungus. This diseases being serious and widespread on a large number of host plants long been popular mycologists and plant pathologists. (Persoon, 1801.de-Bray,1863, Butier ,1918 Holliday1980,Verma etal.,1983 and Saharan,1984). Among the white rust diseases of several crop ,the one caused by *Albugo* candida on Cruciferae and some species of the Capparidaceae and ,Cleomaceae has been reported to be the most widespread.Other economically important related species of *Albugo* include,white rust of spinach due to *A. occidentalis*,(Wilson,1970;Wiant 1937)White rust of Sweet potato due to *A.ipomoeae-panduratae*,(Ciferria,1928,Harter and Weimer,1929 and Demelo,1947) .White rust of water spinach due to *A.pomona* (Safelyetal.1953) and sunflower due to *A. trsgopogonis*( Mukerji1975).

Biochemical changes in the host during pathogenicity are important aspects. According to (Maheshwari and Chaturvedi,1983) swelling and disruption of subcellular rich in lysosomal acid hydrolase was produced but acid phosphatase activity, Acid phosphatase activity in antheridia, oogonia ,oospores of *A. candida* indicate that the enzyme play a role in the synthesis of fungal organ .Long et al.( 1974) showed increase in activity of acid invertase in *Senecio squalidus.*

### Materials and Methods

**Qualitative Analysis of Amino Acids-**

Analysis of amino acids was made in the alcoholic extracts of healthy and diseased plant sample .The qualitative analysis was carried out by two dimensional descending chromatography using conventional procedure. The solvent system was n-butanol-acetic acid –water (4:1:3) in the first direction and phenol: distilled water ( 4:1) in second direction .The duration of development was 16 to 19 hours. The dried paper chromatograms were sprayed with 0.5% acetone to give colour visibility of the amino acid spots which were then identified by calculating the RF values and comparing them with the standard chromatogram run simultaneously.

**Estimation of Mineral Constituents:**

2 g of oven dried crushed leaf samples of healthy and infected host plant leaves were digested

according to the method of Toth et al.( 1948).The acid digested samples were used estimation of potassium and calcium by adopting standard flame photometric procedure. The estimation were carried out in triplicates and the results are the means of the three

**a) Calcium( Ca)-**

An aliquot (25ml) of the said soluble ash portion was diluted to 150 ml distilled water. Few drops of methyl red were added and mixture was neutralized with ammonia ( NH3) solution, till the pink colour changed to yellow. The solutions were heated to boiling and 10 ml ammonium oxalate solution was added in every sample. The mixture was allowed to boil for few minutes. Then glacial acetic acid was added till distantly pink colour reappears. The mixture was then kept side for 12 to 24 hr.at room temperature. In the precipitate of calcium oxalate which settled down, it was filtered through Whatmen filter paper N0 42.The precipitate was washed several times water to make it free from acid. It then was transferred in a small beaker by piercing a hole in the filter paper and pouring over it about 15 ml $2NH_2SO_4$.This was heated to $40^0$C and titrated against 0.01 N Kmno4 solution until the first drop which gave the solution a pink coloration persisting for at least 30 second. Ammonia of calcium was calculated using an equation

1 ml $KMNO_4$=0.2004 mg calcium

The percent calcium on dry matter basis was then calculated on the basis of amount used for ashing. The volume to which acid solution of ash was diluted the volume of the aliquot taken for the precipitation of calcium

**Estimation of Phosphorus**-

The acid soluble portion of ash was diluted and treated with molybdste solution. The phosphomolybdic acid formed was then reduced by the addition of 1.2.3 amino naphthol sulfonic acid (ANSA) reagent which produces blue colour. The intensity of the colour may be proportional to the amount of phosphorus present was measured using colorimeter.

**Procedure-** 0.5 ml of acid soluble portion of ash in a test tube was taken, diluted it to a volume of 10 ml with distilled water. Simultaneously a blank was run containing 10 ml distilled water with 1 ml molybdate solution to each test tube, with 0.4 ml ANSA reagent and the optical density (O.D) at 660 nm using colorimeter by settling it to zero with blank was recorded.

The optical density of standard phosphorus solution by preparing a standard graph containing 0 to 1 ml standard phosphorus solution, in the series of test tube. The amount of phosphorus was determined in an aliquot with the help of standard graph and calculated the phosphorus content in the plant sample considering its amount taken for ashing volume of the acid soluble ash and amount of aliquot used for the reaction.

**RESULT AND DISCCUSSION** –

It is clear from the hypertrophied flowers were significantly found with white rust infection in case of mustard and radish only therefore amino acid analysis of such flower extracts were studied and results are given in (Table-1) .It is clear from the results that the drastic addition or deletion of amino acid were seen due to infection. In case of mustard due to infection there was increase in cysteine, phenylalanine and tryptophan contents. While, proline , serine and valine were found to be reduced in the infected flower. Similarly in case of radish due to infection there was increase in arginine, glutamic acid, phenylalanine, tryptophan and valine, whereas, threonine serine, proline and glycine were found to be decreased.

**DISCCUSSION-**

Regarding to qualitative analysis of amino acid in hypertrophied flower show that there was increase in cysteine, phenylalanine and tryptophan contents. While, proline, serine and valine were found to be reduced in infected flower. The amino acid content were significantly changed because of disruption in the metabolism of plant organs under influence of a pathogen. The infection might have caused the breakdown of plant proteins releasing small quantities of tryptophan. Which react with endogenic phenolic acid to produce IAA which is responsible for hypertrophied growth ( Kumari et al., 1970 and Lal et al.,1980) .The composition of minerals in the infected host of *Albugo* show quqntitive reduction in all the host of *Albugo*. Similar result have also found in infected leaf of

Cakile maritime due to *Albugo* (Aldesuque et al.,1992)

**Table No-1**. Qualitative Analysis of Amino Acids in Hypertrophied flower of Mustard and Radish to *Albugo*

| Amino acid | Mustard Flower | | Radish Flower | |
|---|---|---|---|---|
| | Healthy | Infected | Healthy | Infected |
| **Arginine** | - | - | | |
| **Asparagine** | - | - | - | - |
| **Cystine** | + | ++ | + | + |
| **DL-Aspartic acid** | - | | - | - |
| **Glutamic acid** | + | - | - | ++ |
| **Glycine** | - | - | ++ | + |
| **Histidine** | ++ | ++ | - | + |
| **Leucine** | - | + | - | + |
| **Phenylalanine** | + | ++ | + | ++ |
| **Proline** | ++ | - | ++ | - |
| **Serine** | + | - | + | - |
| **Threonine** | + | + | ++ | - |
| **Tryptophan** | + | ++ | - | ++ |
| **Tyrosine** | + | ++ | + | + |
| **Valine** | ++ | + | + | ++ |

It is clear from the result effect of white rust infection on the composition of minerals in host plant the calcium and phosphorus contents of infected and healthy hosts were studied and results are given (table-2). It is clear from the table that both the minerals irrespective of the hosts were found to be significantly reduced due to infection caused by all the species of *Albugo*.

**Table No-2:** Effect of White Rust Infection on Composition of Minerals in Host Plants.

| Host /Pathogen | Minerals | | | |
|---|---|---|---|---|
| | Calcium | | Phosphorus | |
| | Healthy | Infected | Healthy | Infected |
| *Amaranthus spinosus* L *(Albugo bliti)* | **2.6** | **1.9** | **0.40** | **0.28** |
| *Achyranthes aspera* L *( A.bliti)* | **3.9** | **2.2** | **0.38** | **0.27** |
| *Digera muricata* Forsk. *(A.bliti)* | **3.7** | **2.4** | **0.44** | **0.32** |
| *Brassica campestris* L. *(A.candida)* | **3.2** | **2.3** | **0.34** | **0.28** |
| *Convolvulus arvensis* L. *( A.ipomoeae-panduratae)* | **3.5** | **2.1** | **0.41** | **0.32** |
| *Merremia emarginata* Dennst *(A.ipomoeae-panduratae)* | **2.9** | **1.9** | **0.35** | **0.25** |
| *Portulaca oleracea* L. (*A.portilacae)* | **3.8** | **2.3** | **0.49** | **0.36** |

**Values in mg/g dry weight**

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