Plate 1

A = Control Plant at University Campus Area.

B = Affected plant at fly ash polluted area.

C = Leaf with flyash deposition showing small necrotic dark black spots.

D = Black necrotic spots visible on all leaves.
Plate - 2
Kasimpur Thermal Power Plant.
Plate - 3

A = Anomocytic stomata at control site. Fewer in number.
B = Anomocytic stomata at polluted site. Large in number.
C = Small aperture size at control site.
D = Large aperture size at polluted site.
Plate - 4

A = Trichome at control site

B = Reduced trichome length and septation at control site.

C = Higher number of trichomes at polluted site

D = Increased trichome length and septation at polluted site.
Plate - 5

A = Single vessel element with reticulate thickening from control site.

B = Arrangement of vessel elements.

C = Vessel element with decreased diameter from control site.

D = Arrangement of vessels element (close view).
A = Vessel element with wider diameter from polluted site.
B = Vessel element with reticulate thickening.
C = Arrangement of vessel elements.
D = Single vessel element.
**P1**

NR : Normal roots

**P2**

SR : Normal roots highly branched

**P3**

SG : Initiation of normal secondary growth

**P4**

NX : Normal secondary xylem
P5

$J_2$ : Second-stage juveniles

P6

$J_2$ : Juvenile

P7

$J_2$ : Second-stage juveniles

Vs : Vascular strand

P8

$J_2$ : Passage made by migrating second-stage juveniles

N : Nematode

P : Passage made by nematode
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<td><strong>GCC</strong> : Giant cell complex</td>
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P-13

HTC : Hypertrophied cells
N : Nematode

P-14

HCT : Hyperchromate tissue
SX : Secondary xylem
N : Nematode

P-15

N : Nematode
GC : Giant cell
F : Fibres

P-16

N : Nematode
P-17
N : Nematode
J₂ : Second-stage juvenile
GC : Giant Cell

P-18
J₂ : Second-stage juvenile
N : Nematode
GC : Giant cell

P-19
N : Nematode
GCC : Giant cell complex

P-20
N : Nematode
GCC : Giant cell complex
**P-21**

N : Nematode  
GC : Giant cells

**P-22**

Hn : Hypertrophied nucleus  
Nu : Nucleolus  
GC : Giant cell

**P-23**

GCC : Giant cells complex  
N : Nematode  
HTP : Hypertrophied parenchyma

**P-24**

N : Nematode  
GC : Giant cell  
HP : Hypertrophied parenchyma
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**P-33**

GCC : Giant cell complex  
N    : Nematode

**P-34**

GC   : Giant cell  
Hn   : Hypertrophical nucleus  
N    : Nematode

**P-35**

GC   : Giant cell  
HTC  : Hypertrophied cells  
N    : Nematode

**P-36**

GC   : Giant cell  
N    : Nematode
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**P-41**

GCC : Giant cell complex

AVT : Abnormal vascular tissue

AX : Abnormal Xylem


**P-42**

AX : Abnormal xylem

GCC : Giant cell complex

N : Nematode

AP : Abnormal phloem


**P-43**

EM : Egg mass

Nu : Hypertrophied nucleoli

NX : Normal xylem

N : Nematode


**P-44**

N : Nematode

GC : Giant cell

NX : Normal xylem
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P-49

AP : Abnormal Phloem
N : Nematode
GCC : Giant cell complex

P-50

GCC : Giant cell complex
N : Nematode

P-51

N : Nematode
GC : Giant cell
V : Vacuole

P-52

EM : Egg mass
GC : Giant cell
N : Nematode
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N : Nematode
GC : Giant cell
EM : Egg mass

P-58

AX : Abnormal xylem
GCC : Giant cell complex
EM : Egg mass
GC : Giant cell
N : Nematode

P-59

NX : Normal xylem
N : Nematode
EM : Egg mass

P-60

N : Nematode
E : Egg
EM : Egg mass
**P-61**

AX : Abnormal xylem

N : Nematode

**P-62**

E : Eggs

N : Nematode

CP :

**P-63**

CP :

EM : Egg mass

HC : Hypertrophied cells

**P-64**

EM : Egg mass

N : Nematode
| P-66 | GC : Giant cell | N : Nematode | EM : Egg mass |
| P-68 | GC : Giant cell | N : Nematode | EM : Egg mass | AX : Abnormal xylem | AP : Abnormal phloem |
| P-65 | EM : Egg mass |
| P-67 | N : Nematode | EM : Egg mass |
N : Nematode

AX : Abnormal xylem

GCC : Giant cell complex

GC : Giant cell

PE : Phloem elements

XE : Xylem elements

N : Nematode

GC : Giant cell

VS : Vascular strand

AX : Abnormal xylem
P-73

GC : Giant cell
AX : Abnormal xylem
N : Nematode
XS : Xylem strand

P-74

N : Nematode
SP : Secondary phloem
SX : Secondary xylem
N : Nematode

P-75

N : Nematode

P-76

AVE : Abnormal vessel elements
N : Nematode
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GCC : Giant cell complex
AX : Abnormal xylem
AP : Abnormal phloem
N : Nematode

GCC : Giant cell complex
Nh : Nematod head
AP : Abnormal phloem
AX : Abnormal xylem

R : Secondary and tertiary roots

GR : Galled roots
G : Gall
P-85

G : Gall

P-86

G : Gall

P-87

J\textsubscript{2} : Second-stage juveniles

P-88

J\textsubscript{2} : Second-stage juvenile

N : Nematode

GCC : Giant cell complex
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N : Nematode
GCC : Giant cell complex

P-94

N : Nematode

P-95

N : Nematode

P-96

N : Nematode
EM : Egg mass
P-97
N : Nematode
GC : Giant cell
EM : Egg mass

P-98
GCC : Giant cell complex
AX : Abnormal xylem
Hn : Hypertrophied nucleus
N : Nematode

P-99
AP : Abnormal phloem
AX : Abnormal xylem
GCC : Giant cell complex

P-100
AP : Abnormal phloem
N : Nematode
GCC : Giant cell complex
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| P-102 | Nematode : Giant cell complex
| P-103 | Nematode : Abnormal xylem
| P-104 | Nematode : Giant cell complex

GCC : Giant cell complex
GC  : Giant cell
P-105
N : Nematode
GC : Giant cell
GCC : Giant cell complex
EM : Egg mass

P-106
N : Nematode
GC : Giant cell
GCC : Giant cell complex

P-107
Hn : Hypertrophied nucleus
Nu : Nucleolus in hypertrophied nuclei

P-108
N : Nematode
AX : Abnormal xylem
AP : Abnormal phloem
GCC : Giant cell complex
AX : Abnormal xylem

N : Nematode
AX : Abnormal xylem

GC : Giant Cell
N : Nematode
AX : Abnormal xylem
GCC : Giant Cell complex

SX : Secondary xylem
GC : Giant Cell
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GCC : Giant Cell complex

EM : Egg mass

N : Nematode

AX : Abnormal xylem

GC : Giant cell
**P-126**

White cottony mass of *Macrophomina* on PDA slant

**P-128**

Fungal mat of *M. phaseolina* on Richards medium.

**P-127**

Production of sclerotia on slant

**P-129**

NR: Normal root

**P-130**

NR = Normal root

IR = Infect root with rotting symptoms

**P-131**

GR = Girdling of collar region.

LR = Formation of lateral roots.

RR = Rotted root.
**P-132**

IS  = Infect stem with discolouration.

RR  = Rotting of root at wounded site.

**P-133**

LR  = Invasion of lateral root.

Cr  = Cracking appears after extensive infection on tap root.

**P-134**

Complete rotting of tap root after severe infection.

**P-135**

Partial discolouration of lower stem with rotting symptoms

**P-136**

Characteristic symptom of charcoal rot appears in the rind of stack

**P-137**

Vascular discolouration and complete rotting of pith region.
**P-138**

Close view of internal vascular discolouration and presence of black sclerotia in the pith region.

**P-139**

Black microsclerotia on the surface of roots.

**P-140**

Microsclerotia as black specks in the collar region.

**P-141**

Infected tap root with complete rotting.

**P-142**

Deformation of epidermal cells, cortical region and vascular portion.

**P-143**

Complete lysis of vascular region with destruction of cortical cells.
P-144
Network of fungal hyphae within cortical cells.

P-145
Interwoven fungal hyphae in the vascular region of severely infected root.

P-146
The extensive damage in the vessels element leading to cell separation and death.

P-147
Growth of fungal hyphae in the vascular region.

P-148
Hyphae in human of vessels element.

P-149
The highly branched, septate and dendroide mycelium within the cell.
P-150
Lysis of cell after fungal hyphae penetration.

P-151
Severe infection in root (L.S.).

P-152
The mycelium growing through vessels elements and sieve tube elements throughout the infected root.

P-153
Distortion, fragmentation and lysis of cells.

P-154
Abnormal xylem strand with damaged vascular elements.

P-155
Hypertrophied cortical parenchyma and multinucleated cells.
**P-156**
Amoeboid, multinucleated xylem element and abnormal xylem strands.

**P-157**
Interwoven, supercoiled hyphae forming sclerotia.

**P-158**
Interwoven black sclerotia in cortical region.

**P-159**
Semi-embed pycnidium.

**P-160**
Globose pycnidium with conspicuous opening.

**P-161**
Root with pycnidia, distorted cortical and vascular region (T.S.).
P-162
Adhesion and penetration of AM fungal hypae.

P-163
Fungal hyphae passing through stelar region of the root.

P-164
Branching of fungal hypae in the cortical region of the root.

P-165
Growth of fungal hyphae in the endodermal region along the length of the root.

P-166
Appressorium (ap) in the inner cortex.

P-167
Penetrating hypha in outer root tissues forming an appressorium (ap), and intercellular proliferation (ih) in the cortical parenchyma.
P-168
Highly branched arbuscules (ar).

P-169
Arbuscules (ar) in whole roots stained with trypan blue.

P-170
Arbuscules under higher magnification (40x).

P-171
Highly branched arbuscule stained with trypan blue and lactophenol.