

# Screening of Disease Resistant Varieties against Brown Leaf Spot Disease of Paddy

## Abstract:

Brown leaf spot disease of paddy is the most serious disease of rice. 25 varieties were screening against brown leaf spot caused by *Helminthosporium oryzae* during session 2014 and 2015. The results were four varieties recorded viz. NDR-359, CR 1, CR 2, N-18 in highly resistant. Seven varieties were recorded viz. PR-103, IR-36, Prasad, Narendra-2, IR-597, OC-1339, Cross-116 in resistant. Six varieties were recorded viz. IET-849, Pusa NR-381, Narendra-80, Narendra Dhan-97, Jalnidhi, Jallahari in moderately resistant. Three varieties were recorded viz. Rupali, MTU-7029, Sweta in moderately susceptible. IET-2969 and Annapurna was recorded in susceptible. Three varieties were recorded viz. Nagina-22, CR-126, Cauvery highly susceptible in all three screening condition laboratory, pot and field. In view of present investigation, it is provide a use full information the farmers by which they can use these varieties which are resistant to brown leaf spot disease of paddy. This may increase the productivity and save the economy of farmers.

**Key word:** disease screening; resistant varieties; brown leaf spot; paddy.

## Introduction:

Rice (*Oryza sativa* L.) fulfills the need of food product in the most of the developing countries of the world. It provide energy in the form of starch, about half of the world population depended upon the rice in per day meal. More than 3.5 billion people depend on rice for more than 20% of their daily calories (IRRI Rice facts, 2012). According to FAO (2010) rice is cultivated in 114 countries and has got third rank in the world after maize and wheat. India produce 2240 kg/ha rice annually. India rank second in term of production of the world being next to the China (FAO, 2010).

In India rice grown on above one-fourth of the total crop area and provides food to about half of the country's population. Rice is playing a vital role in our national food security. It's growing different part of country due to their wide adaptability. Due to infection of several type of pathogens, resulting causes extensive damage to the crop. Fungi alone account for nearly 30 diseases of rice in the country (Rangaswami & Mahadeven, 1999). Among these, a few occur in epiphytotic form in many parts of India and one of the important disease is brown leaf spot of paddy caused by *Drechslera oryzae* Subramanian and Jain (*Helminthosporium oryzae* Breda de Hann) which caused havoc loss in Bengal during 1942-43.

Brown leaf spot disease is the most serious disease of rice (Arshad et al., 2008). It caused Bengal Famine in 1942, with yield loss of 50-90%, which resulted in death of 2 million people due to starvation. The pathogen can infects both seedlings and mature plants with the coleoptile, leaves, leaf sheath, panicle branches, glumes, and spike lets (Webster and Gunnell, 1992). The disease is also known as poor rice farmer's disease because it occurs mostly in deficient and poor soils (Agarwal, 1989; Mia, 1998; Zadoks, 2002). The disease has been noted to reduce yields from 6 to 90% in Asia (Padmanabhan, 1973; Estrada, 1984; Mew and Gonzales, 2002).

The present research work provides a usefull information to the farmers by which they can use these varieties which are resistant to brown leaf spot disease of paddy. This may increase the productivity and save the economy of farmers.

#### **Material and Methods:**

The present studies were carried out at Department of Botany, University of Allahabad. during Jun-Oct, 2014 and Jun-Oct 2015 for the screening of disease resistant varieties against brown leaf spot of paddy.

#### **Collection of infected part material:**

The pathogens *H. oryzae* were collected the infected plant from the rice field in Allahabad district of Uttar Pradesh.

#### **Isolation, purification of (*Helminthosporium oryzae*) :**

Infected leaves and nodes of rice plant were cut into small pieces (0.5-1.0 cm) and surface sterilized with 2% sodium hypochlorite for two minutes. These cut pieces were then washed with sterilized water and placed on PDA plates. These PDA plates were incubated at 25 °C for 5 days for the isolation of causal agent. The identification of the pathogen was made by studying the colony characteristics of the isolates on the PDA plates by following the method described in a technical bulletin on seed borne disease and seed health testing of rice (Agrawal *et al.*, 1989).

#### **Preparation of suspension of pathogen:**

I have prepared aqueous suspension of  $1 \times 10^6$  spores/ml of a virulent isolate of *Helminthosporium oryzae*.

#### **Laboratory screening:**

25 varities have been selected for the experiment 10 seeds of each variety with three replication germinate in Petri dices after that sprayed with already prepared suspension of *H. oryzae* inoculum in petri dices.

#### **Pot screening:**

In pot condition also 25 varieties have been selected each variety transplanting in 10 pot with three replication transplanted at the rate of 3 seedling in per pot. Fertilizer used 50% NPK+ BGA with FYM (Alam et al 2014).

#### **Field screening:**

25 varities also have been selected in field condition 22 days old rice seedling were transplanted in experimental plot of 4.10×2.5 meter at the rate of 3 seedling/hill and 20 cm row to row space and 15 cm plant to plant distance. The experiment was carried out in Randomized Block Design (RBD) with three replications. Fertilizer used 50% NPK+ BGA with FYM (Alam et al 2014).

The data for disease incidenc were recorded at one month interval to assess the level of resistance or susceptibility of each test variety according to following disease rating scale (Junaid A.K. 2000).

| Percent Infection<br>(Disease incidence) | Host Response<br>(Level of resistance / susceptibility) |
|------------------------------------------|---------------------------------------------------------|
| 0-10                                     | Highly resistant                                        |
| 11-20                                    | Resistant                                               |
| 21-40                                    | Moderately resistant                                    |
| 41-60                                    | Moderately susceptible                                  |
| 61-80                                    | Susceptible                                             |
| 81-100                                   | Highly susceptible                                      |

# **Result:**

In current study, 25 varieties screened against *Helminthosporium oryzae* during the session 2014 and 2015, Four varieties were recorded viz. NDR-359, CR 1, CR 2, N-18 in highly resistant. Seven varieties were recorded viz. PR-103, IR-36, Prasd, Narendra-2, IR-597, OC-1339, Cross-116 in resistant. Six varieties were recorded viz. IET-849, Pusa NR-381, Narendra-80, Narendra Dhan-97, Jalnidhi, Jallahari in moderately resistant. Three varieties were recorded viz. Rupali, MTU-7029, Sweta in moderately susceptible. IET-2969 and Annapurna was recorded in susceptible. Three varieties were recorded viz. Nagina-22, CR-126, Cauvery highly susceptible in all three screening condition laboratory, pot and field (Table 7).

**Table 1: Screening of disease resistant varieties against *H. oryzae* in laboratory condition session 2014:**

| S. No. | Varieties  | Total no. of Seeds | Infected paddy seeds in petri plate |     |     | Mean±SD   | D I   |
|--------|------------|--------------------|-------------------------------------|-----|-----|-----------|-------|
|        |            |                    | P 1                                 | P 2 | P 3 |           |       |
| 1      | IET-849    | 10                 | 3                                   | 2   | 2   | 2.33±0.58 | 23.30 |
| 2      | Rupali     | 10                 | 4                                   | 5   | 4   | 4.33±0.58 | 43.30 |
| 3      | NDR-359    | 10                 | 1                                   | 0   | 1   | 0.67±0.58 | 6.70  |
| 4      | CR 1       | 10                 | 0                                   | 0   | 1   | 0.33±0.58 | 3.30  |
| 5      | PR-103     | 10                 | 2                                   | 1   | 1   | 1.33±0.58 | 13.30 |
| 6      | IR-36      | 10                 | 3                                   | 1   | 2   | 2.00±1.00 | 20.00 |
| 7      | MTU-7029   | 10                 | 4                                   | 5   | 5   | 4.67±0.58 | 46.70 |
| 8      | CR-2       | 10                 | 1                                   | 0   | 1   | 0.67±0.58 | 6.70  |
| 9      | Prasd      | 10                 | 1                                   | 1   | 2   | 1.33±0.58 | 13.30 |
| 10     | Sweta      | 10                 | 5                                   | 6   | 4   | 5.00±1.00 | 50.00 |
| 11     | Annapurna  | 10                 | 6                                   | 7   | 6   | 6.33±0.58 | 63.30 |
| 12     | Narendra-2 | 10                 | 2                                   | 1   | 2   | 1.67±0.58 | 16.70 |
| 13     | IET-2969   | 10                 | 7                                   | 6   | 7   | 6.67±0.58 | 66.70 |
| 14     | IR-597     | 10                 | 2                                   | 1   | 2   | 1.67±0.58 | 16.70 |

|    |                     |    |   |   |   |           |       |
|----|---------------------|----|---|---|---|-----------|-------|
| 15 | N-18                | 10 | 1 | 1 | 0 | 0.67±0.58 | 6.30  |
| 16 | OC-1339             | 10 | 2 | 1 | 2 | 1.67±0.58 | 16.70 |
| 17 | Pusa NR-381         | 10 | 3 | 2 | 2 | 2.33±0.58 | 23.30 |
| 18 | Cross-116           | 10 | 1 | 2 | 1 | 1.33±0.58 | 13.30 |
| 19 | Nagina-22           | 10 | 8 | 9 | 8 | 8.33±0.58 | 83.30 |
| 20 | Narendra-80         | 30 | 4 | 3 | 2 | 3.00±1.00 | 30.00 |
| 21 | CR-126              | 10 | 8 | 9 | 9 | 8.67±0.58 | 86.70 |
| 22 | Narendra<br>Dhan-97 | 10 | 2 | 2 | 4 | 2.67±1.15 | 26.70 |
| 23 | Jalnidhi            | 10 | 3 | 2 | 3 | 2.67±0.58 | 26.70 |
| 24 | Jallahari           | 10 | 2 | 3 | 2 | 2.33±0.58 | 23.30 |
| 25 | Cauvery             | 10 | 9 | 8 | 9 | 8.67±0.58 | 86.70 |

**Table 2: Screening of disease resistant varieties against *H. oryzae* in pot condition session 2014:**

| S. No. | Varieties   | Total no.<br>of plant | Infected plant of paddy in pot |     |     | Mean±SD   | D I   |
|--------|-------------|-----------------------|--------------------------------|-----|-----|-----------|-------|
|        |             |                       | P 1                            | P 2 | P 3 |           |       |
| 1      | IET-849     | 10                    | 3                              | 3   | 4   | 3.33±0.58 | 33.30 |
| 2      | Rupali      | 10                    | 4                              | 5   | 5   | 4.66±0.58 | 46.60 |
| 3      | NDR-359     | 10                    | 1                              | 0   | 2   | 1.00±1.00 | 10.00 |
| 4      | CR 1        | 10                    | 0                              | 1   | 1   | 0.66±0.58 | 6.60  |
| 5      | PR-103      | 10                    | 2                              | 2   | 2   | 2.00±0.00 | 20.00 |
| 6      | IR-36       | 10                    | 2                              | 1   | 3   | 2.00±1.00 | 20.00 |
| 7      | MTU-7029    | 10                    | 5                              | 4   | 6   | 5.00±1.00 | 50.00 |
| 8      | CR 2        | 10                    | 0                              | 1   | 1   | 0.66±0.58 | 6.60  |
| 9      | Prasd       | 10                    | 2                              | 0   | 2   | 1.33±1.15 | 13.30 |
| 10     | Sweta       | 10                    | 5                              | 5   | 6   | 5.33±0.58 | 53.0  |
| 11     | Annapurna   | 10                    | 7                              | 8   | 7   | 7.33±0.58 | 73.30 |
| 12     | Narendra-2  | 10                    | 2                              | 2   | 2   | 2.00±0.00 | 20.00 |
| 13     | IET-2969    | 10                    | 8                              | 7   | 6   | 7.00±1.00 | 66.70 |
| 14     | IR-597      | 10                    | 2                              | 1   | 2   | 1.66±0.58 | 16.60 |
| 15     | N-18        | 10                    | 1                              | 1   | 1   | 1.00±0.00 | 10.00 |
| 16     | OC-1339     | 10                    | 1                              | 2   | 1   | 1.33±0.58 | 13.30 |
| 17     | Pusa NR-381 | 10                    | 3                              | 3   | 2   | 2.66±0.58 | 26.60 |
| 18     | Cross-116   | 10                    | 2                              | 1   | 2   | 1.66±0.58 | 16.60 |
| 19     | Nagina-22   | 10                    | 9                              | 8   | 9   | 8.66±0.58 | 86.60 |
| 20     | Narendra-80 | 30                    | 3                              | 4   | 3   | 3.33±0.58 | 33.30 |
| 21     | CR-126      | 10                    | 8                              | 9   | 9   | 8.66±0.58 | 86.60 |

|    |                  |    |   |   |   |           |       |
|----|------------------|----|---|---|---|-----------|-------|
| 22 | Narendra Dhan-97 | 10 | 5 | 4 | 4 | 4.33±0.58 | 43.30 |
| 23 | Jalnidhi         | 10 | 3 | 3 | 2 | 2.66±0.58 | 26.60 |
| 24 | Jallahari        | 10 | 3 | 2 | 4 | 3.00±1.00 | 30.00 |
| 25 | Cauvery          | 10 | 9 | 8 | 9 | 8.66±0.58 | 86.60 |

**Table 3: Screening of disease resistant varieties against *H. oryzae* in field condition session 2014:**

| S. No. | Varieties        | Total no. of plant | Infected plant of paddy in field |     |     | Mean±SD  | D I   |
|--------|------------------|--------------------|----------------------------------|-----|-----|----------|-------|
|        |                  |                    | F 1                              | F 2 | F 3 |          |       |
| 1      | IET-849          | 320                | 96                               | 98  | 94  | 96±2.00  | 30.00 |
| 2      | Rupali           | 320                | 138                              | 137 | 139 | 138±1.00 | 43.12 |
| 3      | NDR-359          | 320                | 19                               | 20  | 18  | 19±1.00  | 5.94  |
| 4      | CR 1             | 320                | 15                               | 17  | 16  | 16±1.00  | 5.00  |
| 5      | PR-103           | 320                | 46                               | 48  | 47  | 47±1.00  | 14.69 |
| 6      | IR-36            | 320                | 41                               | 39  | 40  | 40±1.00  | 12.50 |
| 7      | MTU-7029         | 320                | 145                              | 148 | 145 | 146±1.73 | 45.62 |
| 8      | CR 2             | 320                | 16                               | 15  | 17  | 16±1.00  | 5.00  |
| 9      | Prasid           | 320                | 40                               | 43  | 43  | 42±1.73  | 13.12 |
| 10     | Sweta            | 320                | 148                              | 147 | 149 | 148±1.00 | 46.25 |
| 11     | Annapurna        | 320                | 212                              | 214 | 216 | 214±2.00 | 66.87 |
| 12     | Narendra-2       | 320                | 46                               | 48  | 47  | 47±1.00  | 14.69 |
| 13     | IET-2969         | 320                | 210                              | 214 | 212 | 212±2.00 | 66.25 |
| 14     | IR-597           | 320                | 42                               | 44  | 43  | 43±1.00  | 13.44 |
| 15     | N-18             | 320                | 22                               | 24  | 23  | 23±1.00  | 7.19  |
| 16     | OC-1339          | 320                | 39                               | 41  | 40  | 40±1.00  | 12.50 |
| 17     | Pusa NR-381      | 320                | 75                               | 77  | 76  | 76±1.00  | 23.75 |
| 18     | Cross-116        | 320                | 43                               | 45  | 44  | 44±1.00  | 13.75 |
| 19     | Nagina-22        | 320                | 270                              | 273 | 273 | 272±1.73 | 85.00 |
| 20     | Narendra-80      | 320                | 95                               | 97  | 96  | 96±1.00  | 30.00 |
| 21     | CR-126           | 320                | 265                              | 268 | 265 | 266±1.73 | 83.12 |
| 22     | Narendra Dhan-97 | 320                | 89                               | 90  | 88  | 89±1.00  | 27.81 |
| 23     | Jalnidhi         | 320                | 83                               | 84  | 82  | 83±1.00  | 25.94 |
| 24     | Jallahari        | 320                | 90                               | 91  | 89  | 90±1.00  | 28.12 |
| 25     | Cauvery          | 320                | 266                              | 266 | 269 | 267±1.73 | 83.44 |

**Table 4: Screening of disease resistant varieties against *H. oryzae* in laboratory condition session 2015:**

| S. No. | Varieties        | Total no. of Seeds | Infected of paddy seeds in petri plate |     |     | Mean±SD   | D I   |
|--------|------------------|--------------------|----------------------------------------|-----|-----|-----------|-------|
|        |                  |                    | P 1                                    | P 2 | P 3 |           |       |
| 1      | IET-849          | 10                 | 3                                      | 3   | 2   | 2.67±0.58 | 26.70 |
| 2      | Rupali           | 10                 | 4                                      | 5   | 4   | 4.33±0.58 | 43.30 |
| 3      | NDR-359          | 10                 | 0                                      | 1   | 1   | 0.67±0.58 | 6.70  |
| 4      | CR 1             | 10                 | 1                                      | 0   | 0   | 0.33±0.58 | 3.30  |
| 5      | PR-103           | 10                 | 2                                      | 1   | 2   | 1.67±0.58 | 16.70 |
| 6      | IR-36            | 10                 | 2                                      | 1   | 1   | 1.33±0.58 | 13.30 |
| 7      | MTU-7029         | 10                 | 5                                      | 4   | 6   | 5.00±1.00 | 50.00 |
| 8      | CR-2             | 10                 | 0                                      | 0   | 1   | 0.33±0.58 | 3.30  |
| 9      | Prasid           | 10                 | 2                                      | 1   | 2   | 1.67±0.58 | 16.70 |
| 10     | Sweta            | 10                 | 6                                      | 5   | 4   | 5.00±1.00 | 50.00 |
| 11     | Annapurna        | 10                 | 7                                      | 6   | 8   | 7.00±1.00 | 70.00 |
| 12     | Narendra-2       | 10                 | 1                                      | 1   | 2   | 1.33±0.58 | 13.30 |
| 13     | IET-2969         | 10                 | 7                                      | 6   | 8   | 7.00±1.00 | 70.00 |
| 14     | IR-597           | 10                 | 1                                      | 2   | 1   | 1.33±0.58 | 13.30 |
| 15     | N-18             | 10                 | 0                                      | 1   | 0   | 0.33±0.58 | 3.30  |
| 16     | OC-1339          | 10                 | 1                                      | 2   | 2   | 1.67±0.58 | 16.70 |
| 17     | Pusa NR-381      | 10                 | 2                                      | 3   | 3   | 2.67±0.58 | 26.70 |
| 18     | Cross-116        | 10                 | 1                                      | 3   | 1   | 1.67±1.15 | 16.70 |
| 19     | Nagina-22        | 10                 | 9                                      | 8   | 9   | 8.67±0.58 | 86.70 |
| 20     | Narendra-80      | 30                 | 3                                      | 4   | 3   | 3.33±0.58 | 33.30 |
| 21     | CR-126           | 10                 | 9                                      | 8   | 9   | 8.67±0.58 | 86.70 |
| 22     | Narendra Dhan-97 | 10                 | 4                                      | 3   | 3   | 3.33±0.58 | 33.30 |
| 23     | Jalnidhi         | 10                 | 2                                      | 3   | 4   | 3.00±1.00 | 30.00 |
| 24     | Jallahari        | 10                 | 2                                      | 2   | 4   | 2.67±1.15 | 26.70 |
| 25     | Cauvery          | 10                 | 8                                      | 9   | 8   | 8.33±0.58 | 83.30 |

**Table 5: Screening of disease resistant varieties against *H. oryzae* in pot condition session 2015:**

| S. No. | Varieties        | Total no. of plant | Infected plant of paddy in pot |     |     | Mean±SD   | D I   |
|--------|------------------|--------------------|--------------------------------|-----|-----|-----------|-------|
|        |                  |                    | P 1                            | P 2 | P 3 |           |       |
| 1      | IET-849          | 10                 | 3                              | 2   | 4   | 3.00±1.00 | 30.00 |
| 2      | Rupali           | 10                 | 4                              | 4   | 5   | 4.33±0.58 | 43.30 |
| 3      | NDR-359          | 10                 | 1                              | 1   | 1   | 1.00±0.00 | 10.00 |
| 4      | CR 1             | 10                 | 1                              | 0   | 0   | 0.33±0.58 | 3.30  |
| 5      | PR-103           | 10                 | 1                              | 2   | 2   | 1.67±0.58 | 16.70 |
| 6      | IR-36            | 10                 | 1                              | 2   | 1   | 1.33±0.58 | 13.30 |
| 7      | MTU-7029         | 10                 | 4                              | 5   | 5   | 4.67±0.58 | 46.70 |
| 8      | CR 2             | 10                 | 1                              | 0   | 1   | 0.67±0.58 | 6.70  |
| 9      | Prasid           | 10                 | 2                              | 1   | 2   | 1.67±0.58 | 16.70 |
| 10     | Sweta            | 10                 | 4                              | 4   | 5   | 4.33±0.58 | 43.30 |
| 11     | Annapurna        | 10                 | 6                              | 8   | 7   | 7.00±1.00 | 70.00 |
| 12     | Narendra-2       | 10                 | 1                              | 2   | 1   | 1.33±0.58 | 13.30 |
| 13     | IET-2969         | 10                 | 7                              | 6   | 7   | 6.67±0.58 | 66.70 |
| 14     | IR-597           | 10                 | 1                              | 1   | 2   | 1.33±0.58 | 13.30 |
| 15     | N-18             | 10                 | 1                              | 0   | 1   | 0.67±0.58 | 6.70  |
| 16     | OC-1339          | 10                 | 1                              | 2   | 2   | 1.67±0.58 | 16.70 |
| 17     | Pusa NR-381      | 10                 | 3                              | 2   | 2   | 2.33±0.58 | 23.30 |
| 18     | Cross-116        | 10                 | 2                              | 1   | 2   | 1.67±0.58 | 16.70 |
| 19     | Nagina-22        | 10                 | 9                              | 8   | 8   | 8.33±0.58 | 83.30 |
| 20     | Narendra-80      | 30                 | 3                              | 3   | 3   | 3.00±0.00 | 30.00 |
| 21     | CR-126           | 10                 | 9                              | 8   | 8   | 8.33±0.58 | 83.30 |
| 22     | Narendra Dhan-97 | 10                 | 3                              | 2   | 3   | 2.67±0.58 | 26.70 |
| 23     | Jalnidhi         | 10                 | 2                              | 2   | 3   | 2.33±0.58 | 23.30 |
| 24     | Jallahari        | 10                 | 2                              | 2   | 4   | 2.67±1.15 | 26.70 |
| 25     | Cauvery          | 10                 | 8                              | 8   | 9   | 8.33±0.58 | 83.30 |

**Table 6: Screening of disease resistant varieties against *H. oryzae* in field condition session 2015:**

| S. No. | Varieties | Total no. of Seeds | Infected plant of paddy in field |     |     | Mean±SD  | D I   |
|--------|-----------|--------------------|----------------------------------|-----|-----|----------|-------|
|        |           |                    | F 1                              | F 2 | F 3 |          |       |
| 1      | IET-849   | 320                | 94                               | 97  | 94  | 95±1.73  | 29.69 |
| 2      | Rupali    | 320                | 135                              | 136 | 137 | 136±1.00 | 42.50 |

|    |                     |     |     |     |     |          |       |
|----|---------------------|-----|-----|-----|-----|----------|-------|
| 3  | NDR-359             | 320 | 18  | 19  | 17  | 18±1.00  | 5.62  |
| 4  | CR 1                | 320 | 14  | 16  | 15  | 15±1.00  | 4.69  |
| 5  | PR-103              | 320 | 45  | 47  | 46  | 46±1.00  | 14.37 |
| 6  | IR-36               | 320 | 43  | 38  | 42  | 41±2.64  | 12.81 |
| 7  | MTU-7029            | 320 | 144 | 148 | 143 | 145±2.64 | 45.31 |
| 8  | CR 2                | 320 | 15  | 17  | 16  | 16±1.00  | 5.00  |
| 9  | Prasd               | 320 | 38  | 42  | 40  | 40±2.00  | 12.50 |
| 10 | Sweta               | 320 | 146 | 147 | 145 | 146±1.00 | 45.62 |
| 11 | Annapurna           | 320 | 210 | 211 | 215 | 212±2.64 | 66.25 |
| 12 | Narendra-2          | 320 | 45  | 47  | 46  | 46±1.00  | 14.37 |
| 13 | IET-2969            | 320 | 209 | 211 | 210 | 210±1.00 | 65.62 |
| 14 | IR-597              | 320 | 41  | 43  | 42  | 42±1.00  | 13.12 |
| 15 | N-18                | 320 | 22  | 23  | 21  | 22±1.00  | 6.87  |
| 16 | OC-1339             | 320 | 41  | 43  | 42  | 42±1.00  | 13.12 |
| 17 | Pusa NR-381         | 320 | 76  | 75  | 74  | 75±1.00  | 23.47 |
| 18 | Cross-116           | 320 | 44  | 43  | 42  | 43±1.00  | 13.44 |
| 19 | Nagina-22           | 320 | 270 | 269 | 268 | 269±1.00 | 84.06 |
| 20 | Narendra-80         | 320 | 94  | 96  | 95  | 95±1.00  | 29.69 |
| 21 | CR-126              | 320 | 263 | 268 | 264 | 265±2.64 | 82.81 |
| 22 | Narendra<br>Dhan-97 | 320 | 87  | 88  | 86  | 87±1.00  | 27.19 |
| 23 | Jalnidhi            | 320 | 80  | 84  | 79  | 81±2.64  | 25.31 |
| 24 | Jallahari           | 320 | 88  | 90  | 86  | 88±2.00  | 27.50 |
| 25 | Cauvery             | 320 | 264 | 263 | 265 | 264±1.00 | 82.50 |

**Table 7: Screened varieties against *H. oryzae* in laboratory, pot and field condition session 2014 and 2015:**

| S. No. | Host Response<br>Level of<br>resistance | Range<br>of D I<br>(%) | Session 2014 and 2015                                        |                                                              |                                                              |
|--------|-----------------------------------------|------------------------|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|
|        |                                         |                        | Laboratory<br>condition                                      | Pot condition                                                | Field condition                                              |
| 1      | Highly resistant                        | 0-10                   | NDR-359, CR 1, CR 2, N-18                                    | NDR-359, CR 1, CR 2, N-18                                    | NDR-359, CR 1, CR 2, N-18                                    |
| 2      | Resistant                               | 11-20                  | PR-103, IR-36, Prasd, Narendra-2, IR-597, OC-1339, Cross-116 | PR-103, IR-36, Prasd, Narendra-2, IR-597, OC-1339, Cross-116 | PR-103, IR-36, Prasd, Narendra-2, IR-597, OC-1339, Cross-116 |
| 3      | Moderately                              | 21-40                  | IET-849, Pusa                                                | IET-849, Pusa                                                | IET-849, Pusa                                                |

|          |                                   |               |                                                                         |                                                                         |                                                                         |
|----------|-----------------------------------|---------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|-------------------------------------------------------------------------|
|          | <b>resistant</b>                  |               | NR-381,<br>Narendra-80,<br>Narendra Dhan-<br>97, Jalnidhi,<br>Jallahari | NR-381,<br>Narendra-80,<br>Narendra Dhan-<br>97, Jalnidhi,<br>Jallahari | NR-381,<br>Narendra-80,<br>Narendra Dhan-<br>97, Jalnidhi,<br>Jallahari |
| <b>4</b> | <b>Moderately<br/>susceptible</b> | <b>41-60</b>  | Rupali, MTU-<br>7029, Sweta,                                            | Rupali, MTU-<br>7029, Sweta                                             | Rupali, MTU-<br>7029, Sweta                                             |
| <b>5</b> | <b>Susceptible</b>                | <b>61-80</b>  | IET-2969,<br>Annapurna                                                  | IET-2969,<br>Annapurna                                                  | IET-2969,<br>Annapurna                                                  |
| <b>6</b> | <b>Highly<br/>susceptible</b>     | <b>81-100</b> | Nagina-22, CR-<br>126, Cauvery                                          | Nagina-22, CR-<br>126, Cauvery                                          | Nagina-22, CR-<br>126, Cauvery                                          |

## Discussion:

### Screening of disease resistant varieties against *H. oryzae* in laboratory condition season 2014 and 2015:

On the basis of result examined in the laboratory condition it has found that Highly resistant varieties range of DI (0-10 %), the disease incidence level of varieties were recorded as NDR-359 (6.70%), CR-1 (3.30%), CR-2 (6.70%), N-18 (6.30%) during the session 2014 (Table 1) whereas the disease incidence level of varieties NDR-359, CR-1 above the same DI and CR-2 (3.30%), N-18 (3.30%) in the season 2015 (Table 4). Resistant varieties range of DI (11-20 %), the disease incidence level of varieties were recorded as PR-103 (13.30%), IR-36 (20%), Prasad (13.30%), Narendra-2, IR-597, OC-1339 (16.70%), Cross-116 (13.30%) during session 2014 (Table 1) whereas the disease incidence level of varieties were recorded as PR-103 (16.70%), IR-36 (13.30%), Prasad (16.70%), Narendra-2, IR-597 (13.30%), OC-1339, Cross-116 (16.70%) in the season 2015 (Table 4). Moderately resistant varieties range of DI (21-40 %), the disease incidence level of varieties were recorded as IET-849, Pusa NR-381, Jallahari (23.30%), Narendra-80 (30%), Narendra Dhan-97, Jainidhi (26.70%) during the session 2014 (Table 1) whereas the disease incidence level of varieties were recorded as IET-849, Pusa NR-381, Jallahari (26.70%), Narendra-80, Narendra Dhan-97 (33.30%), Jalnidhi (30%) in the season 2015 (Table 4). Moderately susceptible varieties range of DI (41-60 %), the disease incidence level of varieties were recorded as Rupali (43.30%), MTU-7029 (47.70%), Sweta (50.00%) during the session 2014 (Table 1) whereas the disease incidence level of varieties were recorded as Rupali (43.30%), MTU-7029 (50.00%), Sweta (50.00%) in the season 2015 (Table 4).

Susceptible varieties range of DI (61-80 %), the disease incidence level of varieties were recorded as Annapurna (63.30%), IET-2969 (66.70%) during the session 2014 (Table 1) whereas the disease incidence level of varieties were recorded as Annapurna, IET-2969 (70.00%) in the season 2015 (Table 4). Highly susceptible varieties range of DI (81-100 %), the disease incidence level of varieties were recorded as Nagina-22 (83.30%), CR-126 (86.70%), Cauvery (87.70%) during the session 2014 (Table 1) whereas the disease incidence level of varieties were recorded as Nagina-22, CR-126 (86.70%), Cauvery (83.30%) (Table 4).

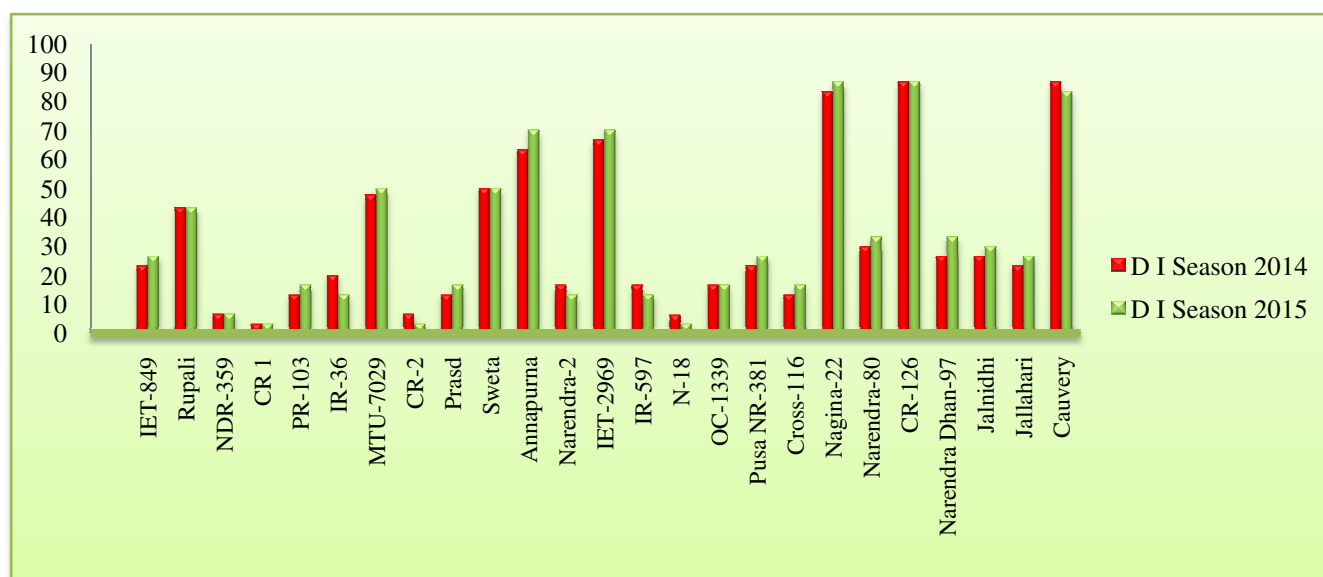


**Fig 1:** Disease incidence level in laboratory condition season 2014 and 2015

### Screening of disease resistant varieties against *H. oryzae* in pot condition season 2014 and 2015:

On the basis of result examined in the pot condition it has found that Highly resistant varieties range of DI (0-10 %), the disease incidence level of varieties were recorded as NDR-359, N-18 (10%), CR-1, CR-2 (6.60%) during the session 2014 (Table 2) whereas the disease incidence level of varieties were recorded as NDR-359, CR-2 above the same DI and CR-1 (3.30%), N-18 (6.70%) in the season 2015 (Table 5). Resistant varieties range of DI (11-20 %), the disease incidence level of varieties were recorded as PR-103, IR-36, Narendra-2 (20%), Prasad, OC-1339 (13.30%), IR-597, Cross-116 (16.70%) during the session 2014 (Table 2) whereas the disease incidence level of varieties were recorded as PR-103, Prasad, OC-1339, Cross-116

(16.70%), IR-36, Narendra-2, IR-597 (13.30%) in the season 2015 (Table 5). Moderately resistant varieties range of DI (21-40 %), the disease incidence level of varieties were recorded as IET-849, Narendra-80 (33.30%), Pusa NR-381, Jalnidhi (26.60%), Narendra Dhan-97, Jallahari (30%) during the session 2014 (Table 2) whereas the disease incidence level of varieties were recorded as IET-849, Narendra-80 (30%), Pusa NR-381, Jalnidhi (23.30%), Narendra Dhan-97, Jallahari (26.70%) in the season 2015 (Table 5). Moderately susceptible varieties range of DI (41-60 %), the disease incidence level of varieties were recorded as Rupali (46.60%), MTU-7029 (50.00%), Sweta (53.30%) during the session 2014 (Table 2) whereas the disease incidence level of varieties were recorded as Rupali (43.30%), MTU-7029 (46.70%), Sweta (43.30%) in the season 2015 (Table 5). Susceptible varieties range of DI (61-80 %), the disease incidence level of varieties were recorded as Annapurna (73.30%), IET-2969 (66.70%) during the session 2014 (Table 2) whereas the disease incidence level of varieties were recorded as Annapurna (70.00%), IET-2969 (66.70%) in the season 2015 (Table 5). Highly susceptible varieties range of DI (81-100 %), the disease incidence level of varieties were recorded as Nagina-22, CR-126, Cauvery (86.60%) during the session 2014 (Table 2) whereas the disease incidence level of varieties were recorded as varieties Nagina-22, CR-126, Cauvery (83.30%) in the season 2015 (Table 5)

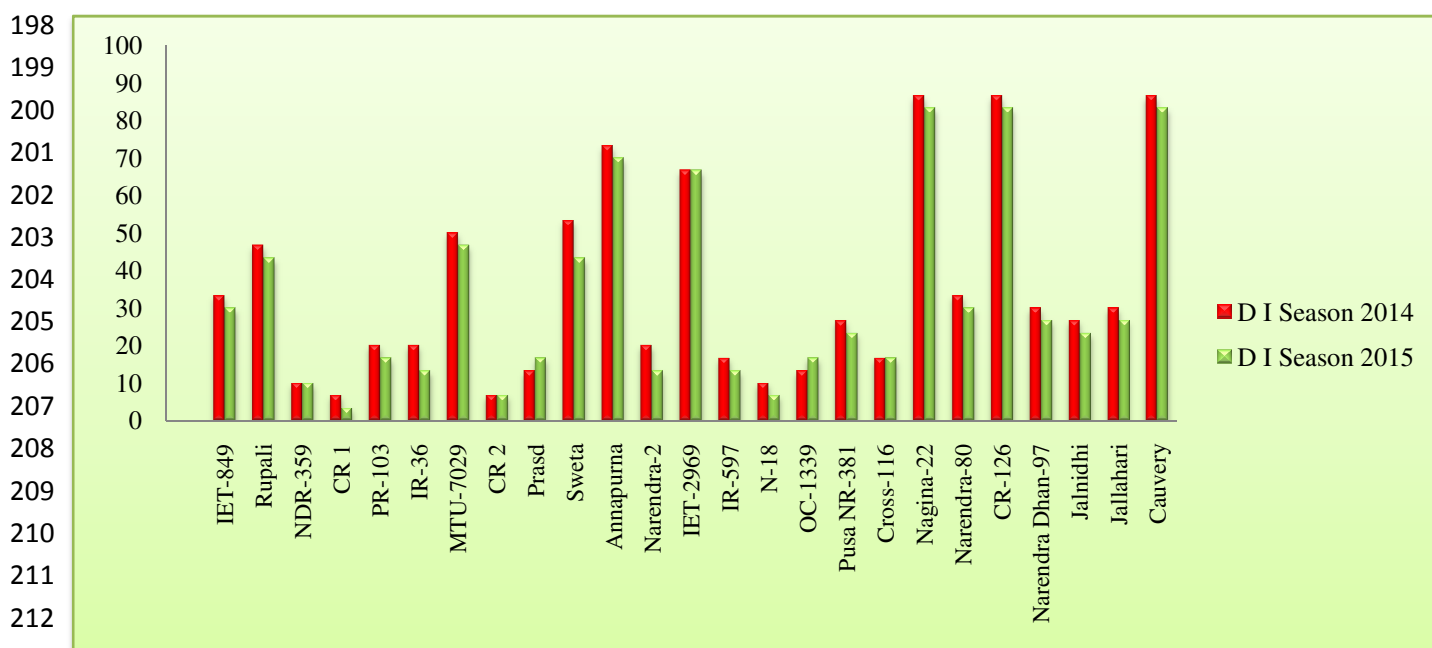


**Fig 2:** Disease incidence level in pot condition season 2014 and 2015

**Screening of disease resistant varieties against *H. oryzae* in field condition season 2014 and 2015:**

On the basis of result examined in the pot condition it has found that Highly resistant varieties range of DI (0-10 %), the disease incidence level of varieties were recorded as NDR-359 (5.94%), CR-1, CR-2 (5%), N-18 (7.19%) during the session 2014 (Table 3) whereas the disease incidence level of varieties were recorded as NDR-359 (5.62%), CR-1 (4.69%), CR-2 (5%), N-18 (6.87%) in the season 2015 (Table 7). Resistant varieties range of DI (11-20 %), the disease incidence level of varieties were recorded as PR-103 (14.69%), IR-36, OC-1339 (12.50%), Prasad (13.12%), Narendra-2 (14.69%), IR-597 (13.44%), Cross-116 (13.75%) during the session 2014 (Table 3) whereas the disease incidence level of varieties were recorded as PR-103, Narendra-2 (14.37%), IR-36 (12.81%), Prasad (12.50%), IR-597, OC-1339 (13.12%) in the season 2015 (Table 6). Moderately resistant varieties range of DI (21-40 %), the disease incidence level of varieties were recorded as IET-849, Narendra-80 (30%), Pusa NR-381 (23.75%), Narendra Dhan-97 (27.81%), Jalnidhi (25.94%), Jallahari (28.12%) during the session 2014 (Table 3) whereas the disease incidence level of varieties were recorded as IET-849, Narendra-80 (29.69%), Pusa NR-391 (23.47%), Narendra Dhan-97 (27.19%), Jalnidhi (25.31%), Jallahari (27.50%) in the season 2015 (Table 6). Moderately susceptible varieties range of DI (41-60 %), the disease incidence level of varieties were recorded as Rupali (43.12%), MTU-7029 (45.62%), Sweta (46.25%) during the session 2014 (Table 3) whereas the disease incidence level of varieties were recorded as Rupali (42.50%), MTU-7029 (45.31%), Sweta (45.62%) in the season 2015 (Table 6). Susceptible varieties range of DI (61-80 %), the disease incidence level of varieties were recorded as Annapurna (66.87%), IET-2969 (66.25%) during the session 2014 (Table 3) whereas the disease incidence level of varieties were recorded as Annapurna (66.25%), IET-2969 (65.62%) in the season 2015 (Table 6). Highly susceptible varieties range of DI (81-100 %), the disease incidence level of varieties were recorded as Nagina-22 (85.00%), CR-126 (83.12%), Cauvery (83.44%) during the session 2014 (Table 3) whereas the disease incidence level of varieties were recorded as Nagina-22 (84.06%), CR-126 (82.81%), Cauvery (82.50%) in the season 2015 (Table 6).

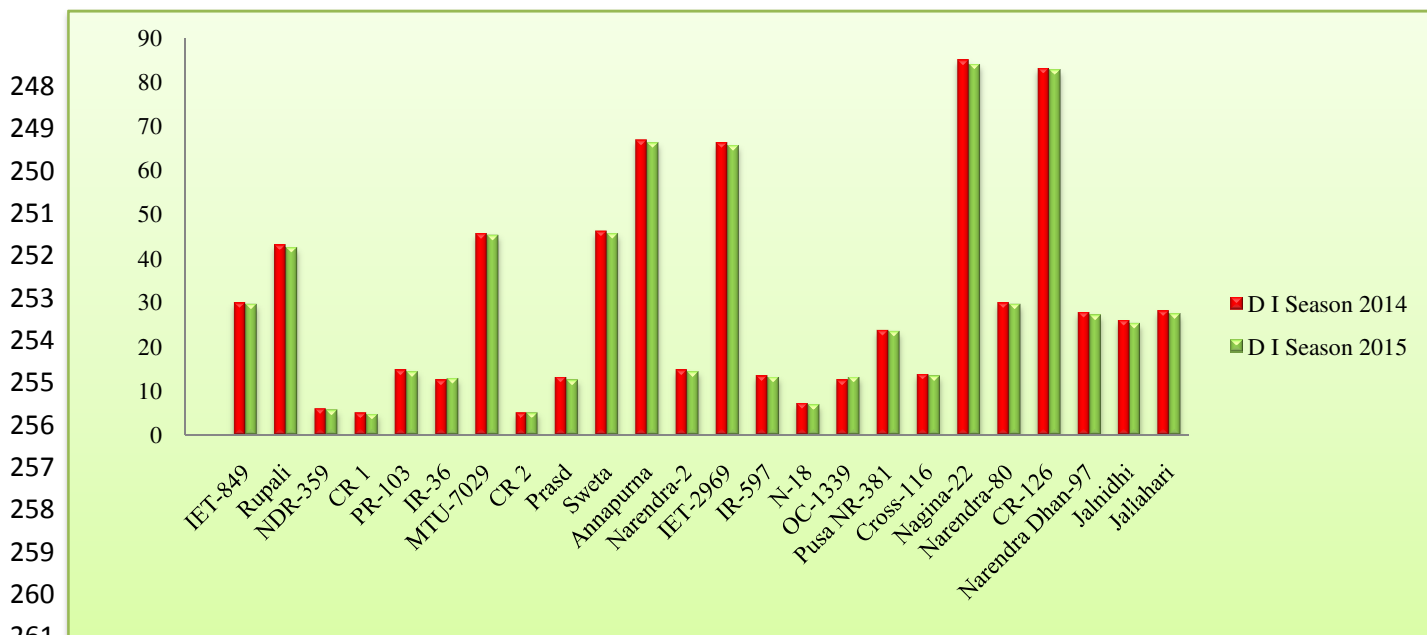


**Fig 3:** Disease incidence level in field condition season 2014 and 2015

This type of study were also done by Prasad *et al.* (1998), Jha *et al.* (1999), Chuahan *et al.* (2000) and Payasi and Singh (2001). Payasi and Singh (2001) found resistant character in accession lines JR75, RWR92-3 and RWR54 against brown spot of rice. Hossain and Kulkarni (2001) and Castano *et al.* (1990) were also reported variability in rice germplasm in response to various diseases. They also categorized rice germplasm into different groups ranging from highly susceptible to highly resistant against various rice diseases. Saifullah *et al.* (1991) and Nagaraju *et al.* (1991) have also showed significant variability in rice genotypes against diseases. Chuahan *et al.* (2000) screened the accession line Lohana 1, Kalamkata and Rangi as highly resistant against brown spot. Jha *et al.* (1999) found six highly resistant and three resistant among fifty rice accession lines in India While Arshad *et al.*, 2008 found only one entry among seventy entries was resistant against brown leaf spot. Bonman, 1992, managing the brown leaf spot disease, the most desirable means is host resistance, especially in developing countries

Similar results were also reported by Saifullah, (1995) screened 23 genotypes during 1990 and 1991 that 19 genotypes were highly resistance and 3 resistant to leaf and neck blast caused by *Pyricularia oryzae*. Khan *et al.* (2001) screened 39 (course) and 40 (fine) entries/varieties for three years from Rice Research Institute Kala Shah Kaku and NIAB, Faisalabad. The screening revealed that amongst the course entries/varieties like IR-6 and KS-282 were found highly resistant in 1998 and resistant in 1999 and 2000 while on over all basis IR-8, DR-82 and DM- 15-1-95 were found resistant in the entire test. Similar results were also reported by Haq *et al.* (2002) in screening of twenty five rice germplasm lines and found that two lines KSK-282 and IRRI-6 were highly resistant. The screening of rice germplasm against the blast disease was also carried out in other rice growing countries. Mohanta *et al.* (2003) in screening trials at Bangladesh reported that among twenty eight restored line and four standard

checks, three were highly resistant, 12 resistant, 16 moderately susceptible. Castano et al. (1990) developed methods for screening of 437 upland genotype from Indonesia (IAT), Colombia and IRRI (Philippines) for resistance to *Pyricularia oryzae* six times within two years and found that 176 genotype were highly resistant while other had low to high susceptibility to rice blast disease.

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