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**Alok Kumar**

Department of Entomology,  
C.S.A. University of Agriculture  
and Technology Kanpur,  
Uttar Pradesh, India

**Jitendra Kumar**

Department of Entomology,  
C.S.A. University of Agriculture  
and Technology Kanpur,  
Uttar Pradesh, India

**Vikas Kumar Rai**

Department of Soil Science and  
Agricultural Chemistry, Indian  
Agriculture Research Institute  
New Delhi, India

**Vivek Kumar Patel**

Department of Soil Science and  
Agricultural Chemistry, Acharya  
Narendra Deva University of  
Agriculture and Technology  
Kumarganj, Ayodhya,  
Uttar Pradesh, India

**Santosh Kumar**

Department of Entomology,  
C.S.A. University of Agriculture  
and Technology Kanpur,  
Uttar Pradesh, India

**Abhay Kumar**

Department of Agricultural  
Biotechnology and Molecular  
Biology, Dr. Rajendra Prasad  
Central Agricultural University,  
Pusa, Samastipur, Bihar, India

**Ankit Singh**

Department of Agronomy,  
Dr. Rajendra Prasad Central  
Agricultural University, Pusa,  
Samastipur, Bihar, India

**Corresponding Author:****Alok Kumar**

Department of Entomology,  
C.S.A. University of Agriculture  
and Technology Kanpur,  
Uttar Pradesh, India

## Screening of the barley germplasm/varieties against barley aphid (*Rhopalosiphum maidis*) Fitch

**Alok Kumar, Jitendra Kumar, Vikas Kumar Rai, Vivek Kumar Patel, Santosh Kumar, Abhay Kumar and Ankit Singh**

**Abstract**

One hundred thirty six varieties/germplasm (one infector check after 20 varieties) of barley were screened to the susceptibility/resistance to aphid, (*Rhopalosiphum maidis*) was conducted at the Crop Research Farm, Nawabganj, C.S. Azad University of Agriculture and Technology, Kanpur during *rabi* season 2018-19. The germplasm viz. The result of screening of various varieties/germplasm of barley against *Rhopalosiphum maidis* indicate that the least incidence was recorded on barley varieties HUB 262, HUB 263 and RD 2988 having (4.66, 4.33 and 3.64 aphids/shoot). The variety BL 802 and HUB 261 was found moderately resistant with the aphid population was observed (7.86 and 8.66 aphids/shoot). Seven varieties viz. DWRB 186, DWRB 187, Explore, HBL 789, HUB 260, NDB 1680 and NDB 1683 was observed as susceptible and population ranges varies 11 to 20 aphids/shoot. The population of aphid 18.0, 17.33, 16.00, 13.67, 19.30, 19.61 and 20.05 aphids/shoot, respectively. The highest infestation was observed in variety RD 2799(C) having (100.66 aphids/shoot).

**Keywords:** Barley, germplasm, susceptibility, *Rhopalosiphum maidis*

**Introduction**

Barley (*Hordeum vulgare* L.) is one of the most important cereal crops in the world, occupying fourth position in cultivation after wheat, rice and maize and third in total cereal production. The countries, where barley is mostly grown are Morocco, Ethiopia, Turkey, Canada, U.S.A., Spain, U. K. Australia, U.S.S.R. and France <sup>[1]</sup>. In India barley crop is grown over an area of 6.65 lakh hectare with production of 17.7 lakh tones and productivity of 26.79 q/ha <sup>[1]</sup>. The main barley producing states in our country are Uttar Pradesh, Rajasthan, Bihar, Madhya Pradesh, Haryana, Punjab, Himachal Pradesh, West Bengal, Maharashtra, Sikkim, Delhi and Jammu and Kashmir. The major concentration of barley starts from North-Western districts of Bihar and extends up to Mathura. In west, main barley areas lie in north-eastern and southern districts of Rajasthan and Haryana. In northern hills, barley is grown in Kumowon (U.P.), Kangra, Kullu, Lahauland Spiti valleys of Himachal Pradesh. Uttar Pradesh is also a most important barley growing state of the country with an area of about 1.55 lakh hectare and production of 4.26 lakh tones, and productivity 27.48 q/ha <sup>[1]</sup>. In this way U.P. has great significance both in cultivated area and grain production of barley. The grains of barley contain 12.5 per cent moisture, 11.5 percent albuminoids, 74.0 per cent carbohydrate, 1.3 per cent fat, 3.9 per cent crude fiber and 1.5 per cent ash. The efficacy of relative bio-pesticide and insecticides against listed barley aphid was also evaluated by Alok *et al.* (2020) <sup>[7]</sup>.

From economic cultivation point of view, it is necessary to protect the crop from the attack of *Rhopalosiphum maidis* in early stages. The knowledge of specific appearance and its peak infestation period helps the growers to control the pest well in advance. Not only has this, the factors of environment played an important role in influencing the behavior of this insect. It is the main criteria for effective and efficient pest control. Earlier, various scientists viz., Upadhyaya *et al.* (1979), and Verma *et al.* (1979), have made the efforts to find out the effective control measures against this pest and a large number of bio pesticide and insecticide have been found effective to control barley aphid in some extent <sup>[11, 12]</sup>. Since this crop is grown mostly under low input conditions the use of the expensive insecticides is unbearable to cultivators. Therefore, the alternate solution is to develop aphid resistant barley-varieties and to explore their utility in reducing the aphid population.

The crop is infested by a number of insect pests, viz., armyworm, *Mythimna separata* (Haworth); ghujhia weevil, *Tanymecus indicus* (Faust); termite, *Odontotermes obesus* (Ramb.); cutworms, *Agrotis* spp.; shoot fly, *Atherigona naquii* (Styskal); pink borer, *Sesamia inferens* (Walker); jassids, *Amrasca basalis* (Baly); barley aphid, *Rhopalosiphum maidis* (Fitch) and *R. padi* (Linn.) (Singh, 1983). Among these insect pests, the aphid, *R. maidis* is most serious and regular insect pest of this crop [7]. Both nymphs and adults cause damage by sucking the cell sap from the leaves, stems and earheads. Due to rapid multiplication of the aphid, usually the entire shoot is covered and with the result of continuous desapping by such a large population, yellowing, curling and subsequent drying of leaves takes place which ultimately lead to reduction in size of earheads [4]. The aphid also acts as a vector of barley yellow dwarf virus.

### Materials and Methods

The varietal resistance experiment was laid out in single plot in paired row measuring 1 x 0.45 m. with the resistance/susceptibility against barley aphids, 136 varieties/germplasm (one infector check after 20 varieties) were tested. The sowing was done in furrows behind desi plough having a distance of 23 cm between rows by marking straight lines with help of rope before sowing. The seeds were sown on 11-12-2018.

### Observation

To assess the varietal susceptibility/resistance of barley varieties against *Rhopalosiphum maidis*; the data were recorded at Booting stage, ear emergence, and flowering stage respectively. Aphid count /shoot were recorded from all these varieties. The aphid infestation index were graded in each variety selected 5 randomly plant may be done and average aphid marked out per plant. However, if aphid incidence is severe and population count are not possible. The visual grading of plant may be done as given below [3] (Table: 1).

### Results and Discussion

**Booting stage (04.02.2019):** It is obvious from (Table 1) that the aphid infestation index (II) average number of aphids/shoots (1-5) was found in varieties DWRB 186, DWRB 187, HBL 802, HBL 804, HUB 260, HUB 262, HUB 263, KB 1605, KB 1606, KB 1628, KB 1634, KB 1638, NDB

1680, RD 2974, RD 2978, RD 2980 and RD 2988 having the population 2.0, 2.0, 3.33, 3.25, 3.33, 4.0, 3.0, 5.0, 5.0, 5.0, 5.0, 5.0, 5.0, 5.0 and 2.0 aphids per shoot, respectively. It is considered as resistance in natural condition. Thus the seven varieties of aphids were found to be less in comparison to rest of the varieties.

**Ear emergence and flowering stage (11.02.2019 and 18.02.2019):** At ear emergence stage the data indicated that the both stage are found same aphid infestation index. Maximum at ear emergence and declined at flowering stage due to increase at temperature in the environment. The minimum infestation was observed in the varieties HUB 262, HUB 263 and RD 2988 existing 5.0, 5.0 and 5.0 aphids per shoot respectively. Minimum was found moderately resistant and having the aphid population 10.0 aphids per shoot. The highest infestation was observed the variety RD 2799 (C) (100.66 aphids per shoot) (Table: 2).

The mean aphid population was calculated by pooling all the three observations which indicated that the least incidence was recorded on barley varieties HUB 262, HUB 263 and RD 2988 (4.66, 4.33 and 3.64 aphids per shoot). These varieties was considered as resistant (index II) the varieties BL 802 and HUB 261 was found moderately resistant with the aphid population was observed (7.86 and 8.66 aphids per shoot). Seven varieties viz., DWRB 186, DWRB 187, Explore, HBL 789, HUB 260, NDB 1680 and NDB 1683 was observed as susceptible and populations ranges varies 11 to 20 aphids per shoot. The population of aphid 18.0, 17.33, 16.00, 13.67, 19.30, 19.61 and 20.05 aphids per shoot, respectively. These barley varieties prove to be susceptible against *R. maidis*. Rest of entries was found highly susceptible. The result of present research obtained as earlier worker Kumar *et al.* (2011), reported that 127 barley varieties screened against barley aphids *R. maidis* Fitch. It is considered to moderately resistance. The maximum attack was recorded on variety BHS 365 (168 aphids/shoots). while Choudhary *et al.* (2017) reported that Fifteen genotypes of barley were screened for their comparative resistance to aphid, *R. maidis* [5]. The data revealed that significant difference existed among the germplasm of barley with regards to aphid population. During peak, maximum aphid population was observed on germplasm/varieties, RD-2799 (100.66 aphids /shoots) and minimum on RD-2988 (3.44 aphids/ shoot).

**Table 1:** Aphid infestation index for grading and categorization

| S. No. | Grades | Approx. no. of aphid / shoots | Rating               |
|--------|--------|-------------------------------|----------------------|
| 1.     | I      | 0                             | Immune               |
| 2.     | II     | 1 to 5                        | Resistant            |
| 3.     | III    | 6 to 10                       | Moderately resistant |
| 4.     | IV     | 11 to 20                      | Susceptible          |
| 5.     | V      | 21 or above                   | Highly susceptible   |

**Table 2:** Aphid infestation index in different barley varieties on their stage (i) Booting stage (04.02.2019), (ii) Ear emergence (11.02.2019), (iii) flowering stage (18.02.2019)

| S. No. | Varieties   | Booting Stage           |                      | Ear emergence           |                      | Flowering stage         |                      | Mean of Aphid Infestation Index | Avg. Population/shoot |
|--------|-------------|-------------------------|----------------------|-------------------------|----------------------|-------------------------|----------------------|---------------------------------|-----------------------|
|        |             | Aphid Infestation index | Av. Population/shoot | Aphid Infestation index | Av. Population/shoot | Aphid Infestation index | Av. Population/Shoot |                                 |                       |
|        |             | 04.02.2019              |                      | 11.02.2019              |                      | 18.02.2019              |                      |                                 |                       |
| 1.     | ABI Voyager | 5.0                     | 25                   | 5.0                     | 75                   | 5.0                     | 100                  | 5.0                             | 66.67                 |
| 2.     | Amdreia     | 4.0                     | 15                   | 5.0                     | 50                   | 5.0                     | 70                   | 4.67                            | 45.00                 |
| 3.     | BH 1020     | 5.0                     | 30                   | 5.0                     | 50                   | 5.0                     | 60                   | 5.00                            | 46.67                 |
| 4.     | BH 121      | 5.0                     | 25                   | 5.0                     | 40                   | 5.0                     | 60                   | 5.00                            | 41.67                 |
| 5.     | BHS 461     | 5.0                     | 25                   | 5.0                     | 50                   | 5.0                     | 60                   | 5.0                             | 45.00                 |
| 6.     | BHS 462     | 4.0                     | 20                   | 5.0                     | 50                   | 5.0                     | 70                   | 4.67                            | 46.66                 |
| 7.     | BHS 463     | 4.0                     | 20                   | 5.0                     | 50                   | 5.0                     | 60                   | 4.67                            | 43.33                 |
| 8.     | BHS 464     | 4.0                     | 15                   | 5.0                     | 55                   | 5.0                     | 60                   | 4.67                            | 43.33                 |
| 9.     | BHS 465     | 4.0                     | 15                   | 5.0                     | 45                   | 5.0                     | 50                   | 4.67                            | 36.66                 |
| 10.    | BHS 466     | 4.0                     | 15                   | 5.0                     | 40                   | 5.0                     | 50                   | 4.67                            | 35.00                 |
| 11.    | BHS 467     | 3.0                     | 10                   | 5.0                     | 25                   | 5.0                     | 30                   | 4.33                            | 21.66                 |
| 12.    | BHS 468     | 4.0                     | 15                   | 5.0                     | 40                   | 5.0                     | 50                   | 4.67                            | 35                    |
| 13.    | Danielle    | 3.0                     | 8                    | 5.0                     | 25                   | 5.0                     | 30                   | 4.33                            | 21                    |
| 14.    | DWRB 160    | 4.0                     | 15                   | 5.0                     | 25                   | 5.0                     | 30                   | 4.67                            | 23.3                  |
| 15.    | DWRB 180    | 4.0                     | 20                   | 5.0                     | 25                   | 5.0                     | 50                   | 4.67                            | 31.66                 |
| 16.    | DWRB 181    | 5.0                     | 25                   | 5.0                     | 50                   | 5.0                     | 60                   | 5.0                             | 45                    |
| 17.    | DWRB 182    | 3.0                     | 10                   | 5.0                     | 50                   | 5.0                     | 60                   | 4.33                            | 40                    |
| 18.    | DWRB 183    | 5.0                     | 25                   | 5.0                     | 50                   | 5.0                     | 70                   | 5.0                             | 48.33                 |
| 19.    | DWRB 184    | 4.0                     | 15                   | 5.0                     | 45                   | 5.0                     | 50                   | 4.67                            | 36.67                 |
| 20.    | DWRB 185    | 3.0                     | 10                   | 5.0                     | 25                   | 5.0                     | 30                   | 4.33                            | 21.67                 |
| 21.    | DWRB 186    | 2.0                     | 2                    | 5.0                     | 22                   | 5.0                     | 30                   | 4.0                             | 18                    |
| 22.    | DWRB 187    | 2.0                     | 2                    | 5.0                     | 25                   | 5.0                     | 25                   | 4.0                             | 17.33                 |
| 23.    | DWRB 188    | 3.0                     | 6                    | 5.0                     | 30                   | 5.0                     | 035                  | 4.67                            | 23.67                 |
| 24.    | EXPLORER    | 3.0                     | 6                    | 4.0                     | 20                   | 5.0                     | 22                   | 4.0                             | 16                    |
| 25.    | HBL 789     | 3.0                     | 8                    | 4.0                     | 15                   | 4.0                     | 18                   | 3.67                            | 13.67                 |
| 26.    | HBL 793     | 3.0                     | 10                   | 5.0                     | 25                   | 5.0                     | 30                   | 4.33                            | 21.67                 |
| 27.    | HBL 797     | 3.0                     | 10                   | 5.0                     | 40                   | 5.0                     | 50                   | 4.33                            | 33.33                 |
| 28.    | HBL 802     | 2.0                     | 3.33                 | 3.0                     | 10                   | 3.0                     | 10.25                | 2.67                            | 7.86                  |
| 29.    | HBL 804     | 2.0                     | 3.25                 | 5.0                     | 30.66                | 5.0                     | 50.16                | 4.0                             | 28.02                 |
| 30.    | HBL 812     | 5.0                     | 21                   | 5.0                     | 48                   | 5.0                     | 55                   | 5.0                             | 40.33                 |
| 31.    | HBL 814     | 3.0                     | 10                   | 5.0                     | 40.33                | 5.0                     | 50.16                | 4.33                            | 33.49                 |
| 32.    | HBL 818     | 3.0                     | 8.66                 | 5.0                     | 30.50                | 5.0                     | 35                   | 4.33                            | 24.7                  |
| 33.    | HBL 821     | 4.0                     | 15.16                | 5.0                     | 45.66                | 5.0                     | 50.3                 | 4.66                            | 37.04                 |
| 34.    | HBL 822     | 5.0                     | 21.66                | 5.0                     | 45                   | 5.0                     | 60.33                | 5.0                             | 42.33                 |
| 35.    | HUB 253     | 3.0                     | 10                   | 5.0                     | 35.50                | 5.0                     | 40.66                | 4.33                            | 28.73                 |
| 36.    | HUB 260     | 2.0                     | 3.33                 | 5.0                     | 25.50                | 5.0                     | 30.33                | 4.0                             | 19.30                 |
| 37.    | HUB 261     | 3.0                     | 7.33                 | 3.0                     | 8.66                 | 3.0                     | 10.0                 | 3.00                            | 8.66                  |
| 38.    | HUB 262     | 2.0                     | 4.0                  | 2.0                     | 5.0                  | 2.0                     | 5.0                  | 2.0                             | 4.66*                 |
| 39.    | HUB 263     | 2.0                     | 3.0                  | 2.0                     | 5.0                  | 2.0                     | 5.0                  | 2.0                             | 4.33*                 |
| 40.    | HUB 264     | 4.0                     | 20.0                 | 5.0                     | 40.33                | 5.0                     | 48.5                 | 4.67                            | 36.28                 |
| 41.    | JB 357      | 3.0                     | 10                   | 5.0                     | 28.30                | 5.0                     | 30.66                | 4.33                            | 22.98                 |
| 42.    | JB 360      | 3.0                     | 8                    | 5.0                     | 25.5                 | 5.0                     | 28.3                 | 4.33                            | 20.43                 |
| 43.    | JB 362      | 3.0                     | 8                    | 5.0                     | 25.3                 | 5.0                     | 30.5                 | 4.33                            | 31.44                 |
| 44.    | JB 363      | 3.0                     | 10                   | 5.0                     | 28.6                 | 5.0                     | 32                   | 4.33                            | 25.55                 |
| 45.    | JB 364      | 3.0                     | 10                   | 5.0                     | 30.00                | 5.0                     | 33                   | 4.33                            | 25                    |
| 46.    | KB 1531     | 3.0                     | 10                   | 5.0                     | 25                   | 5.0                     | 28.33                | 4.33                            | 24.44                 |
| 47.    | KB 1605     | 2.0                     | 5.0                  | 5.0                     | 28.30                | 5.0                     | 30.33                | 4.0                             | 21.21                 |
| 48.    | KB 1606     | 2.0                     | 5.0                  | 5.0                     | 25                   | 5.0                     | 35.5                 | 4.0                             | 21.83                 |
| 49.    | KB 1616     | 4.0                     | 15                   | 5.0                     | 35.5                 | 5.0                     | 40.33                | 4.67                            | 30.28                 |
| 50.    | KB 1628     | 2.0                     | 5                    | 5.0                     | 25                   | 5.0                     | 30.66                | 4.0                             | 20.22                 |
| 51.    | KB 1632     | 3.0                     | 10                   | 5.0                     | 25                   | 5.0                     | 30.5                 | 4.33                            | 21.83                 |
| 52.    | KB 1633     | 3.0                     | 12.5                 | 5.0                     | 22.5                 | 5.0                     | 25.66                | 4.33                            | 20.22                 |
| 53.    | KB 1634     | 2.0                     | 5.0                  | 5.0                     | 25.33                | 5.0                     | 30.6                 | 4.0                             | 20.11                 |
| 54.    | KB 1636     | 3.0                     | 10                   | 5.0                     | 30.5                 | 5.0                     | 40.6                 | 4.33                            | 27.05                 |
| 55.    | KB 1638     | 2.0                     | 5.0                  | 5.0                     | 25.5                 | 5.0                     | 30.33                | 4.0                             | 20.28                 |
| 56.    | KB 1640     | 3.0                     | 10                   | 5.0                     | 40.5                 | 5.0                     | 55.3                 | 4.33                            | 35.27                 |
| 57.    | NDB 1680    | 2.0                     | 5.0                  | 5.0                     | 25.5                 | 5.0                     | 28.33                | 4.0                             | 19.61                 |
| 58.    | NDB 1682    | 4.0                     | 12                   | 5.0                     | 40.33                | 5.0                     | 50.3                 | 4.67                            | 34.21                 |
| 59.    | NDB 1683    | 3.0                     | 10.50                | 5.0                     | 25                   | 5.0                     | 30.66                | 4.33                            | 20.05                 |
| 60.    | NDB 1698    | 3.0                     | 8.0                  | 5.0                     | 25.33                | 5.0                     | 35.5                 | 4.33                            | 22.94                 |
| 61.    | NDB 1699    | 5.0                     | 22.30                | 5.0                     | 50.5                 | 5.0                     | 65.66                | 5.0                             | 46.15                 |

|      |            |     |       |     |       |     |       |      |       |
|------|------------|-----|-------|-----|-------|-----|-------|------|-------|
| 62.  | PL 891     | 5.0 | 25    | 5.0 | 75.66 | 5.0 | 100   | 5.0  | 66.87 |
| 63.  | PL 892     | 4.0 | 15.30 | 5.0 | 52.66 | 5.0 | 60.3  | 4.67 | 42.74 |
| 64.  | PL 898     | 5.0 | 25.00 | 5.0 | 40.33 | 5.0 | 60.6  | 5.0  | 41.97 |
| 65.  | PL 900     | 5.0 | 21.33 | 5.0 | 60.66 | 5.0 | 75    | 5.0  | 72.32 |
| 66.  | PL 902     | 4.0 | 15    | 5.0 | 70.50 | 5.0 | 75.33 | 5.0  | 53.61 |
| 67.  | PL 903     | 4.0 | 15    | 5.0 | 35    | 5.0 | 38    | 4.67 | 29.3  |
| 68.  | PL 904     | 3.0 | 10    | 5.0 | 35    | 5.0 | 38.33 | 4.33 | 27.77 |
| 69.  | PL 905     | 4.0 | 20    | 5.0 | 40.33 | 5.0 | 48.5  | 4.67 | 36.28 |
| 70.  | PLANET     | 3.0 | 10    | 5.0 | 30.66 | 5.0 | 35.5  | 4.33 | 25.39 |
| 71.  | RD 2948    | 3.0 | 8.0   | 5.0 | 25    | 5.0 | 28.66 | 4.33 | 20.55 |
| 72.  | RD 2969    | 3.0 | 8.33  | 5.0 | 22.5  | 5.0 | 30    | 4.33 | 20.16 |
| 73.  | RD 2970    | 4.0 | 20    | 5.0 | 35    | 5.0 | 40.33 | 4.67 | 31.33 |
| 74.  | RD 2971    | 3.0 | 8.0   | 5.0 | 25    | 5.0 | 28    | 4.33 | 20.33 |
| 75.  | RD 2972    | 3.0 | 8.0   | 5.0 | 25    | 5.0 | 28.5  | 4.33 | 20.5  |
| 76.  | RD 2973    | 3.0 | 8.0   | 5.0 | 45.33 | 5.0 | 60    | 4.33 | 37.77 |
| 77.  | RD 2974    | 2.0 | 5.0   | 5.0 | 28    | 5.0 | 32.5  | 4.0  | 21.83 |
| 78.  | RD 2975    | 4.0 | 12    | 5.0 | 40.5  | 5.0 | 60.66 | 4.67 | 37.72 |
| 79.  | RD 2976    | 4.0 | 15    | 5.0 | 43    | 5.0 | 60    | 4.67 | 40    |
| 80.  | RD 2977    | 5.0 | 20.66 | 5.0 | 60.3  | 5.0 | 70.75 | 5.0  | 50.58 |
| 81.  | RD 2978    | 2.0 | 5.0   | 5.0 | 35    | 5.0 | 50.66 | 4.0  | 30.22 |
| 82.  | RD 2979    | 3.0 | 10    | 5.0 | 60    | 5.0 | 75    | 4.33 | 48.33 |
| 83.  | RD 2980    | 2.0 | 5.0   | 5.0 | 40.33 | 5.0 | 50    | 4.0  | 31.77 |
| 84.  | RD 2981    | 3.0 | 8.0   | 5.0 | 30.66 | 5.0 | 40    | 4.33 | 26.22 |
| 85.  | RD 2982    | 3.0 | 8.0   | 5.0 | 40.5  | 5.0 | 50.75 | 4.33 | 33.08 |
| 86.  | RD 2983    | 3.0 | 10    | 5.0 | 40    | 5.0 | 50    | 4.33 | 33.33 |
| 87.  | RD 2984    | 4.0 | 20    | 5.0 | 38.66 | 5.0 | 48    | 4.67 | 34.55 |
| 88.  | RD 2985    | 3.0 | 10    | 5.0 | 32.5  | 5.0 | 38.33 | 4.33 | 26.94 |
| 89.  | RD 2986    | 4.0 | 12    | 5.0 | 30    | 5.0 | 35.5  | 4.67 | 25.94 |
| 90.  | RD 2987    | 4.0 | 20    | 5.0 | 40.66 | 5.0 | 55.5  | 4.67 | 38.72 |
| 91.  | RD 2988    | 2.0 | 2.0   | 2.0 | 4.0   | 2.0 | 5.0   | 2.0  | 3.64  |
| 92.  | TRAVELLER  | 3.0 | 10    | 5.0 | 30.66 | 5.0 | 40.3  | 4.33 | 26.98 |
| 93.  | UPB 1070   | 3.0 | 10    | 5.0 | 25    | 5.0 | 35.33 | 4.33 | 23.44 |
| 94.  | UPB 1071   | 4.0 | 15    | 5.0 | 40.5  | 5.0 | 55.33 | 4.67 | 36.94 |
| 95.  | UPB 1072   | 3.0 | 8.0   | 5.0 | 40    | 5.0 | 50.66 | 4.33 | 32.88 |
| 96.  | UPB 1073   | 3.0 | 10    | 5.0 | 50.75 | 5.0 | 60.66 | 4.33 | 40.47 |
| 97.  | UPB 1074   | 5.0 | 25    | 5.0 | 60    | 5.0 | 75.33 | 5.0  | 53.44 |
| 98.  | UPB 1075   | 5.0 | 22    | 5.0 | 70    | 5.0 | 80.33 | 5.0  | 57.44 |
| 99.  | VLB 155    | 5.0 | 25    | 5.0 | 50.25 | 5.0 | 80    | 5.0  | 51.73 |
| 100. | VLB 156    | 4.0 | 15    | 5.0 | 40.66 | 5.0 | 50    | 4.67 | 35.22 |
| 101. | VLB 157    | 3.0 | 10    | 5.0 | 40.33 | 5.0 | 60.33 | 4.33 | 36.89 |
| 102. | VLB 158    | 4.0 | 12    | 5.0 | 60.5  | 5.0 | 80    | 4.67 | 50.83 |
| 103. | VLB 159    | 3.0 | 8.0   | 5.0 | 50.75 | 5.0 | 60    | 4.33 | 39.58 |
| 104. | VLB 160    | 5.0 | 22    | 5.0 | 70.5  | 5.0 | 85.66 | 5.00 | 59.38 |
| 105. | XANADU     | 4.0 | 15    | 5.0 | 25.66 | 5.0 | 35.5  | 4.67 | 25.39 |
| 106. | AZAD ©     | 4.0 | 15.66 | 5.0 | 70.33 | 5.0 | 80.5  | 4.67 | 55.49 |
| 107. | BH 902 ©   | 5.0 | 30    | 5.0 | 17.5  | 5.0 | 75.33 | 5.0  | 58.61 |
| 108. | BH 946 ©   | 4.0 | 20    | 5.0 | 60.66 | 5.0 | 80.5  | 4.67 | 53.73 |
| 109. | BH 959 ©   | 4.0 | 20    | 5.0 | 60.33 | 5.0 | 70    | 4.67 | 50.11 |
| 110. | BHS 352 ©  | 5.0 | 25.50 | 5.0 | 60.00 | 5.0 | 80.66 | 5.0  | 55.38 |
| 111. | BHS 380 ©  | 3.0 | 10    | 5.0 | 50.15 | 5.0 | 60.5  | 4.33 | 40.21 |
| 112. | BHS 400 ©  | 4.0 | 15.30 | 5.0 | 50.33 | 5.0 | 60.66 | 4.67 | 42.09 |
| 113. | DWRB 101 © | 4.0 | 20    | 5.0 | 40.5  | 5.0 | 50.3  | 4.67 | 36.93 |
| 114. | DWRB 123 © | 5.0 | 30    | 5.0 | 70.6  | 5.0 | 80.33 | 5.0  | 60.31 |
| 115. | DWRB 137 © | 4.0 | 15    | 5.0 | 70.66 | 5.0 | 75    | 4.67 | 53.55 |
| 116. | HBL 113 ©  | 3.0 | 10    | 5.0 | 50.50 | 5.0 | 60.66 | 4.33 | 40.38 |
| 117. | HBL 276 ©  | 4.0 | 20    | 5.0 | 50.50 | 5.0 | 66.66 | 4.67 | 45.72 |
| 118. | HUB 113 ©  | 5.0 | 30.33 | 5.0 | 50    | 5.0 | 60.5  | 5.0  | 46.94 |
| 119. | JYOTI ©    | 5.0 | 25.50 | 5.0 | 60.3  | 5.0 | 80    | 5.0  | 52.26 |
| 120. | K 508 ©    | 4.0 | 20    | 5.0 | 60.50 | 5.0 | 80.66 | 4.67 | 53.72 |
| 121. | K 603 ©    | 4.0 | 15    | 5.0 | 50    | 5.0 | 60.5  | 4.67 | 41.83 |
| 122. | KARAN 16 © | 4.0 | 20    | 5.0 | 70.3  | 5.0 | 80.33 | 4.67 | 56.87 |
| 123. | LAKHAN ©   | 3.0 | 10    | 5.0 | 70.2  | 5.0 | 90.66 | 4.33 | 56.95 |
| 124. | NDB 1173 © | 5.0 | 22.20 | 5.0 | 60    | 5.0 | 90.3  | 5.0  | 57.50 |
| 125. | NDB 1445 © | 4.0 | 15    | 5.0 | 70    | 5.0 | 80.2  | 4.67 | 55.06 |
| 126. | NDB 943 ©  | 5.0 | 22    | 5.0 | 80.66 | 5.0 | 100   | 5.0  | 67.55 |
| 127. | PL 751 ©   | 4.0 | 12.5  | 5.0 | 50.5  | 5.0 | 55.66 | 4.67 | 39.55 |
| 128. | RD 2035 ©  | 4.0 | 15    | 5.0 | 50    | 5.0 | 60.5  | 4.67 | 41.83 |
| 129. | RD 2552 ©  | 4.0 | 12    | 5.0 | 60.5  | 5.0 | 80.00 | 4.67 | 50.83 |

|      |           |     |       |     |       |     |        |      |       |
|------|-----------|-----|-------|-----|-------|-----|--------|------|-------|
| 130. | RD 2715 © | 4.0 | 12.50 | 5.0 | 70    | 5.0 | 90.33  | 4.67 | 57.61 |
| 131. | RD 2786 © | 4.0 | 15.50 | 5.0 | 80    | 5.0 | 100.5  | 4.67 | 65.33 |
| 132. | RD 2794 © | 4.0 | 15    | 5.0 | 80.3  | 5.0 | 100.0  | 4.67 | 65.1  |
| 133. | RD 2799 © | 4.0 | 12.3  | 5.0 | 80    | 5.0 | 100.66 | 4.67 | 64.32 |
| 134. | RD 2899 © | 3.0 | 8.0   | 5.0 | 40.33 | 5.0 | 50.66  | 4.33 | 32.99 |
| 135. | RD 2907 © | 4.0 | 12    | 5.0 | 50    | 5.0 | 60.3   | 4.67 | 40.76 |
| 136. | VL 118 ©  | 4.0 | 12.66 | 5.0 | 60    | 5.0 | 75.5   | 4.67 | 49.38 |
| 137. | INFECTOR  | 5.0 | 30.30 | 5.0 | 85.66 | 5.0 | 100    | 5.0  | 71.98 |

## Conclusion

The germplasm/varieties screened in the present investigation were not screened by any other workers in the past except a few. Kumar *et al.* (2011) reported that 127 barley varieties screened against barley aphids *R. maidis* Fitch in Kanpur [6]. The varieties BH 393 and RD 2508(C) resistant being 1.55 and 3.02 aphids/shoot it include aphid infestation index II. Varieties DWRUB 52, NDB 1245, PL 751, RD 2668, RD 2675, DWR 46(C) having being 6.39, 7.99, 8.55, 6.44, 6.56, 6.94 aphids/shoot, respectively. It is considered to moderately resistance. Annual progress report of AICRIP, Barley Network (2015) 124 entries were screened against barley aphid (*R. maidis*) out of these entry DWRB 142 found to be resistant and entry RD 2918 found to be moderately resistant to foliar aphid in barley at Kanpur center. The maximum attack was recorded on variety BHS 365 (168 aphids/shoots). Supports the present findings. Yadav and Jain (2000) reported that relative resistance of 18 barley varieties against barley aphid (*Rhopalosiphum maidis*) under irrigated conditions at Jobner based on aphid populations build-up on the plant [14]. Variety RD 137, RD 1750, RS6, RD 2028, K 5, RD 1795, RS 17 and K 264 were identified as highly resistant having a lower population of aphids. Contrary to the present finding, Verma *et al.* (2010) reported that out of five resistant barley genotypes (EB921, EB2507, Manjula, DL529 and K144) in crosses with susceptible *R. maidis* corroborate the present findings [12]. The significant difference in aphid population among different barley varieties was reported by Sourial and Mitri (2002) [10].

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