Introduction

Black gram (Vigna mungo (L.) Hepper) is a stable crop originated from central Asia and commonly cultivated in South Asia. Vigna mungo is also grown for forage crop, often used as dry season intercrop in rice or wheat, cover crop, and green manure (Göhl, 1982; Jansen, 2006). It prefers on loamy soils or black vertisols, well-drained soils with a pH 6-7 (Arora et al., 1989 and Baligar et al., 2007). It can withstand acidic soils if lime and gypsum (down to pH 4.5) are added to the soil and sensitive to alkaline and saline soils (Sharma et al., 2011; Baligar et al., 2007). It is drought-tolerant and thus suitable for semi-arid areas (Arora et al., 1989). Globally it accounts for over and above 40% of total legume seeds traded (CRN India, 2011).

Pod husks of Vigna mungo are an excellent substitute to rice bran as a feed for Artemia sp. regarding for survival, growth, production of nauplii and fecundity (Yoganandhan et al., 2000). In India it is a third important pulse crop cultivated in an area of 2.29 M ha with 1.96 M t production and 500 kg ha⁻¹ productivity (Department of Agriculture and Cooperation, Government of India, 2014). In India, major urdbean growing areas are...
Andhra Pradesh, Gujarat, Karnataka, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu and Uttar Pradesh and Andhra Pradesh (A.P). In Kharif, it is grown in 0.25 Lakh ha, producing 0.17 Lakh t with a productivity of 676 kg ha\(^{-1}\). In Rabi, it occupies 4.29 Lakh ha, producing 3.39 Lakh t with a productivity of 790 kg ha\(^{-1}\) (Department of Agriculture and Co-operation, Government of A.P. 2014). The crop is of special significance in A.P as it fits well in rice-pulse cropping system as a relay crop particularly in Krishna-Godavari and North Coastal zones. As per graminae, Vigna mungo plant genome sequence (http://archive.gramene.org/db) the genomes (7) and genes (1) literature (107) and ontology (72). Powdery mildew (Erysiphe polygoni) De Condolle (1802) described many species of the genus. Powdery mildew caused by Erysiphe polygoni D C a wide spread plant diseases that are conspicuous by their superficial white mycelia and powder-like conidia (Yarwood, 1957; Kiss and Szentivanyi, 2001). Current classification Fungi, Dikarya, Ascomycota, Pezizomycotina, Leotiomycetes, Leotiomycetidae, Erysiphales, Erysiphaceae, Erysiphe polygoni. Obligate synonyms; Ischnochaeta polygoni (DC.) and Microsphaera polygoni (DC.) Facultative synonyms: Alphitomorpha communis Wallr, Alphitomorpha horridula Wallr, Erysipe communis var. leguminosarum Link, Erysipe communis var. ranunculacearum Link. (www.mycobank.org.in).

Blackgram abides from biotic stress due to fungal, bacterial and viral diseases resulting in heavy yield losses (Nene, 1972). Powdery mildew reported as a serious problem in all areas of rice-based cropping systems of the country (Abbaiah, 1993) causing considerable yield loss every year due to the reduction in photosynthetic activity and physiological changes (Legapsi et al., 1978). Although the disease was reported to cause considerable loss, information on its prevalence particularly after the advent of the survey and epidemiological factors influencing the disease development.

**Materials and Methods**

The present investigation was carried out during rabi 2015-16, Agricultural College Farm and Department of Plant Pathology, Agricultural College, Bapatla, Guntur District. Geographically the Agricultural College Farm, Bapatla is situated at an altitude of 5 m above the mean sea level and at 80°30 E Longitude and 15°54 N Latitude and seven km away from the coast of Bay of Bengal.

Survey for the Incidence and severity of Powdery mildew disease of Urdbean

Survey was conducted during 2015-16 rabi season in major urdbean growing mandals of Guntur district, Andhra Pradesh. Four mandals were chosen based on statistics of preceding year where the crop concentration was more. Based on the information, in each mandal two villages and in each village, two fields were surveyed at random. In each field 20 plants were selected at five locations, four corners of the field and one at the centre to record the incidence and severity of powdery mildew, were fixed.

Per cent disease incidence for powdery mildew disease was calculated by using the following formula:

\[ \text{Incidence (PDI)} = \frac{\text{Number of infected plants}}{\text{Total number of plants}} \times 100 \]

The incidence and severity of powdery mildew were recorded mandal-wise. Powdery mildew severity was assessed by disease rating (AICRP, MULLaRP, 2013) (Table 1).
The per cent disease index (PDI) was computed from the above scale by using the following formula (Wheeler, 1969).

\[
PDI = \left( \frac{\text{Sum of all the numerical ratings}}{\text{Number of observations} \times \text{maximum disease grade}} \right) \times 100
\]

**Influence of weather conditions on severity of powdery mildew in Urdbean**

A trial was conducted to determine the influence of weather conditions on the severity of powdery mildew disease in blackgram. Highly susceptible blackgram cultivar PU 31 was planted in a bulk plot of 10 x 10 m² during rabi 2015-16 at Agricultural College Farm, Bapatla, Andhra Pradesh. The severity of powdery mildew disease was recorded at every five days interval from 35 DAS to one week prior to harvesting. Meteorological data such as rainfall, maximum temperature, minimum temperature, relative humidity at morning and evening hours and wind velocity was collected from the Meteorological Station located at Agricultural college farm, Bapatla. Correlation and regression analyses were conducted to determine the influence of weather conditions on the severity of powdery mildew disease in blackgram.

**Results and Discussion**

**Survey for the incidence and severity of powdery mildew disease of Urdbean**

In Guntur district, a total of 16 fields of eight villages viz., Kantheru, Ponnekalu, Kothapalem, Manchala, Vargani, Nagalupadu, Bhallupadu and Appapuram, belonging to four mandals viz., Tadikonda, Veticherukuru, Pedanandipadu and Kakumanu were surveyed in which PU 31, LBG 752, LBG 623 are being cultivated (Fig. 1). Age of the crop varied in different fields due to variation in dates of sowing. The crops were approximately 40-60 DAS (Table 2). Since the age of the crop is one of the important factors for occurrence and development of powdery mildew. The results of the survey are presented based on an age of the crop as follows. In 40 days old crop the mean powdery mildew disease incidence was maximum in Kothapalem village (57.76%) of Veticherukuru mandal followed by Kantheru village (46.44%) of Tadikonda mandal and minimum in Bhallupadu village (3.43%) of Kakumanu mandal followed by Vargani village (3.67%) of Pedanandipadu mandal and severity was maximum in Kothapalem (51.32%) followed by Ponnekalu village (37.16%) of Tadikonda mandal and minimum in Bhallupadu (2.35%) followed by Vargani (5.73%) (Table 2).

In 60 days old crop the mean powdery mildew disease incidence was maximum in Kantheru (87.01%) followed by Kothapalem (83.10%) and minimum in Vargani (21.91%) followed by Bhallupadu (39.94%) and mean per cent disease index (severity) was maximum in Kantheru (88.08%) followed by Kothapalem (83.73%) and minimum in Vargani (19.16%) followed by Bhallupadu (33.56%) (Table 2 and Fig. 2). The mean disease incidence was in the range of 3.43% (Bhallupadu village at 40 DAS) to 87.01% (Kantheru village at 60 DAS) and severity was in the range of 2.35% (Bhallupadu village at 40 DAS) to 88.08% (Kantheru village at 60 DAS). Highest mean incidence and mean severity was recorded in Tadikonda mandal (81.83 % and 80.76% respectively) and lowest (42.18% and 37.16%) in Pedanandipadu mandal. The variation in disease at various locations may be mainly due to cultivated variety, crop age and climatic factors and cultural practices.

Among the weeds species associated with urdbean fields viz., *Euphorbia geniculata*, *Convolvulus arvensis*, *Sida cordifolia*, *Abutilon indicum*, *Acalypha indica*,
Achyranthes aspera, Andrographis paniculata, Crotalaria verrucosa, Celosia argentina, Digera arvensis, Cleome viscosa, Xanthium strumarium and Mimosa pudica etc. Euphorbia geniculate was found infected with powdery mildew disease in all the four mandals. Findings of Dinesh et al., (2010) reported that powdery mildew disease varied in different locations depending on the crop age. Nour (1958) reported that Euphorbia species were an alternate host for powdery mildew infection. Similarly, field bindweed (Convolvulus arvensis) is highly susceptible to powdery mildew infection as reported by Karkanis et al., (2012).

Symptomology and morphology

The infected leaf surface, petioles, stem and pods appeared as small, round, whitish, powder-like spots (Plate 2). Symptoms first appeared on crown leaves on shaded lower leaves and on leaf under surfaces. These white powdery colonies grew in size and cover both sides of the leaf, petioles and young stems. When disease progressed lower leaves showed and chlorosis, distortion and premature leaf fall due to infection of E. Polygoni. Severe infection of inflorescence was found to affect pod setting where as severe infection at later stages showed shrivelled and dried appearance to immature pods. The morphology of E. polygoni noted that the fungus produced amphigenous dirty white hyaline mycelium and barrel shaped conidia measuring 1.089 µm x 0.7131 µm at 40 x magnification (Plate 1).

Effect of weather factors and age of the crop on powdery mildew severity

A correlation study was undertaken at Agricultural College, Bapatla to study the relationship between severity of powdery mildew disease with weather parameters and crop age. The mean data on the weather parameters viz. maximum temperature (max), minimum temperature (min) (°C), morning relative humidity (RH) (%), evening relative humidity (RH) (%), wind speed (kmph) and rainfall (mm) was recorded from 20 DAS at five days interval upto 65 DAS on PU 31 during rabi 2015-2016 (Fig. 3).

The maximum temperature varied from 26.90 °C to 33.80 °C, minimum temperature varied from 15.30 °C to 26.00 °C. Relative humidity during morning and evening ranged from 87 to 93 per cent and 63 to 89 per cent, respectively. The disease severity ranged from 0 per cent to 90.85 per cent (Table 3).

![Fig.1 Powdery mildew incidence at 40 and 60 DAS in urdbean in Guntur district during rabi 2015-16](attachment:image.png)
**Fig. 2** Powdery mildew severity at 40 and 60 DAS in *urdbean* in Guntur district during *rabi* 2015-16

![Graph showing severity of powdery mildew at 40 and 60 DAS across different villages](image)

**Plate. 1** Morphology of fungus powdery mildew caused by *Erysiphe polygoni* (10X and 40X)

![Morphology image of powdery mildew](image)
Plate.2 Symptoms of powdery mildew disease under field conditions

Table.1 Modified MULLaRP scale (0-5)

| Grade | Description                                                                 | Reaction                  |
|-------|-----------------------------------------------------------------------------|---------------------------|
| 0     | Plants free from infection on leaves, stems free from the disease           | Free (F)                  |
| 1     | Plants showing traces to 10% infection on leaves, stems free from the disease | Highly Resistant (HR)     |
| 2     | Slight infection with thin coating of powdery growth on leaves covering 10.1-25% leaf area, slight infection on stem and the pods usually free | Moderately Resistant (MR) |
| 3     | Dense powdery coating on leaves covering 25.1-50% leaf area, moderate infection on pods | Moderately Susceptible (MS) |
| 4     | Dense powdery coating covering 50.1-75% leaf area, stems heavily and pods moderately infected. Infected portion turns grayish. | Susceptible (S)           |
| 5     | Severe infection with dense powdery growth covering 75% area of the whole plant including pods, stems etc. resulting in premature defoliation and drying. | Highly Susceptible (S)    |
### Table 3: Powdery mildew severity and crop age in relation with weather variables during *rabi*, 2015-16

| S. No. | Crop age | Date of observation | Severity |
|--------|----------|---------------------|----------|
| 1      | 20       | 20-Jan              | 0.00     |
| 2      | 25       | 25-Jan              | 0.00     |
| 3      | 30       | 30-Jan              | 0.00     |
| 4      | 35       | 04-Feb              | 10.41    |
| 5      | 40       | 09-Feb              | 28.92    |
| 6      | 45       | 14-Feb              | 38.88    |
| 7      | 50       | 19-Feb              | 49.49    |
| 8      | 55       | 24-Feb              | 71.60    |
| 9      | 60       | 29-Feb              | 85.61    |
| 10     | 65       | 04-Mar              | 90.85    |

### Table 4: Correlation between powdery mildew disease severity and weather factors during *rabi* 2015-2016

| Sl. No. | Variable                                                      | Correlation coefficient (r) |
|---------|---------------------------------------------------------------|----------------------------|
| 1       | Maximum temperature (°C)                                      | 0.657*                     |
| 2       | Minimum temperature (°C)                                      | 0.063                      |
| 3       | Relative humidity at 8.30 A.M (%)                              | -0.355                     |
| 4       | Relative humidity at 5.30 P.M (%)                              | -0.486                     |
| 5       | Rainfall (mm)                                                 | -0.405                     |
| 6       | Wind speed (Kmph)                                             | -0.527                     |
| 7       | Crop age                                                      | 0.984*                     |

* Significant at 5%  
r tab value=2.306  
N= 10
**Table 2: Survey on the incidence and severity of powdery mildew disease in urdbean in Guntur district of A.P during rabi, 2015**

| Sl. No. | Mandal | Name of the village | Date of observation | Area (in acres) | Variety | Total plants | 40 DAS | 60 DAS | Preceeding / Surrounding crops | Weed flora |
|---------|--------|---------------------|---------------------|-----------------|---------|--------------|--------|--------|-------------------------------|-----------|
|         |        |                     |                     |                 |         |              | Per cent disease incidence | PDI     | Per cent Disease incidence | PDI     |                          |
| 1       | Tadikonda | Kantheru             | 22-Oct              | 2               | LBG 623 | 106          | 45.51  | 26.28  | 87.14                        | 86.92     | Rice/ Blackgram             | Euphorbia geniculate, Sida cordifolia |
|         |        |                     |                     |                 |         |              |        |        |                               |           |                          |                                   |
|         |        |                     |                     | 1               | LBG 752 | 116          | 47.38  | 39.04  | 86.89                        | 89.24     | Rice/ Blackgram             | Abutilon indicum, Acalypha indica, Achyranthes aspera, Andrographis paniculata, Euphorbia geniculate |
|         |        |                     |                     |                 |         |              |        |        |                               |           |                          |                                   |
|         |        |                     |                     |                 |         |              |        |        |                               |           |                          |                                   |
|         |        |                     |                     |                 |         |              |        |        |                               |           |                          |                                   |
|         |        |                     |                     |                 |         |              |        |        |                               |           |                          |                                   |
|         |        |                     |                     |                 |         |              |        |        |                               |           |                          |                                   |
|         |        |                     |                     |                 |         |              |        |        |                               |           |                          |                                   |
|         |        |                     |                     |                 |         |              |        |        |                               |           |                          |                                   |
| 2       |        |                     |                     | 2               | LBG 752 | 100          | 47.87  | 49.64  | 77.09                        | 69.28     | Rice/ Maize                 | Abutilon indicum, Acalypha indica, Achyranthes aspera, Crotalaria verrucosa, Celosia argentina, Cleome viscosa, Xanthium strumarium |

**Village Mean**

|                     |        |                     |                     |                 |         |              | 46.44  | 32.66  | 87.01                        | 88.08     |                          |                                   |

956
| Village     | Mean |  |  |  |  |  |  |  |  |  |
|-------------|------|---|---|---|---|---|---|---|---|---|
| Mandal      | mean |  |  |  |  |  |  |  |  |  |
|  | 40.19 | 41.66 | 76.66 | 73.44 |
|  | 43.31 | 37.16 | 81.83 | 80.76 |
|  |  |  |  |  |  |  |  |  |  |  |
| 2 Veticherukuru Kothapalem | 28-Oct | 3.5 | LBG 752 | 121 | 54.40 | 50.52 | 83.12 | 87.80 | Rice/ Blackgram | Euphorbia geniculata, Crotalaria verrucosa, Celosia argentina, |
| |  | 1 | LBG 752 | 100 | 61.13 | 52.12 | 83.08 | 79.67 | Rice/ Blackgram | Sida cordifolia, Xanthium strumarium |
| Village Mean |  |  |  |  |  |  |  |  |  |  |
|  | 57.76 | 51.32 | 83.10 | 83.73 |
|  |  |  |  |  |  |  |  |  |  |  |
| 3 Machala | 1-Nov | 2 | PU 31 | 94 | 25.82 | 32.58 | 69.02 | 63.00 | Rice/ Blackgram | Achyranthes aspera, Sida cordifolia, Xanthium strumarium |
| | 3 | PU 31 | 109 | 21.61 | 20.38 | 55.87 | 48.52 | Rice/ Blackgram | Abutilon indicum, Acalypha indica, Convolvulus arvensis, Achyranthes aspera, Cleome viscosa, Sida cordifolia, Xanthium strumarium |
| Village mean |  |  |  |  |  |  |  |  |  |  |
|  | 23.71 | 26.48 | 62.44 | 55.76 |
| Mandal Mean |  |  |  |  |  |  |  |  |  |  |
|  | 37.23 | 39.90 | 72.77 | 69.74 |
| Village   | Date      | LBG  | Yield | Area | YS   | NYS  | YS%  | NYS%  | Rice/Blackgram | Plants                                                |
|-----------|-----------|------|-------|------|------|------|------|------|----------------|-------------------------------------------------------|
| Pendanadipadu | 15-Nov    | 96   | 0.00  | 16.51| 16.67|      |      |      |                | Abutilon indicum, Acalypha indica, Achyranthes aspera, Crotalaria verrucosa, |
|           |           | 2.5  | LBG 752 | 108  | 7.34 | 11.46 | 27.31 | 21.64 |                | Abutilon indicum, Acalypha indica, Achyranthes aspera, Acalypha indica, Achyranthes aspera, Celosia argentina, Euphorbia geniculata, Convolvulus arvensis, Cleome viscosa, Sida cordifolia |
| Village Mean |          |      |       |      |      |      |      |      |                | Abutilon indicum, Acalypha indica, Achyranthes aspera, Acalypha indica, Achyranthes aspera, Celosia argentina, Euphorbia geniculata, Convolvulus arvensis, Cleome viscosa, Sida cordifolia |
| Nagulupadu | 23-Nov    | 107  | 6.00  | 18.70| 13.96|      |      |      | Rice/Maize     | Andrographis paniculata, Euphorbia geniculata, Convolvulus arvensis |
|           |           | 3    | PU 31 | 99   | 14.87| 16.47| 45.09| 35.30 | Blackgram/Maize | Abutilon indicum, Euphorbia geniculata, Celosia argentina, |
| Village Mean |          |      |       |      |      |      |      |      |                | Abutilon indicum, Euphorbia geniculata, Celosia argentina, |
| Mandal mean |          |      |       |      |      |      |      |      |                | Abutilon indicum, Euphorbia geniculata, Celosia argentina, |
| Village | Mean | Village | Mean | Village | Mean | Village | Mean |
|---------|------|---------|------|---------|------|---------|------|
| Kakumanu | Bhallupadu 24-Nov | 2 | LBG 752 | 107 | 0.00 | 0.00 | 34.78 | 32.74 | Rice/Blackgram | Mimosa pudica, Acalypha indica, |
| | | 1 | LBG 752 | 100 | 6.86 | 4.70 | 35.10 | 34.38 | Rice/Blackgram | Abutilon indicum, Achyranthes aspera, Andrographis paniculata, |
| | | | | | | | | | |
| | Village Mean | | | | | | | 3.43 | 2.35 | 34.94 | 33.56 |
| Appapuram | 28-Nov | 2.5 | PU 31 | 106 | 9.02 | 6.72 | 39.02 | 38.34 | Rice/Blackgram | Abutilon indicum, Digera arvensis, Cleome viscosa |
| | | | | | | | | | |
| | 4 | LBG 623 | 105 | 45.78 | 33.44 | 78.26 | 73.28 | Rice/Blackgram | Abutilon indicum, Celosia argentea, Digera arvensis, Cleome viscosa, Sida cordifolia, Xanthium strumarium |
| | Village Mean | | | | | | | 27.40 | 20.88 | 58.64 | 55.81 |
| | Mandal Mean | | | | | | | 15.41 | 11.61 | 46.79 | 44.68 |
| | Total Mandal mean | | | | | | | 27.41 | 26.91 | 60.89 | 58.16 |
Table 5: Regression equations of certain weather variables on severity of powdery mildew disease during *rabi* 2015-16

| Sl. No. | Regression equations | F value | Standard error | R^2 |
|--------|----------------------|---------|----------------|-----|
| 1      | \( y = -337.21 + 11.944x_1^* \) | 6.075   | 4.88           | 0.412 |
| 2      | \( y = -320.669 + -11.708x_1^* + 22.900x_2^* \) | 7.940   | 3.83           | 0.681 |
| 3      | \( y = -186.221 + 11.092x_1^* - 22.611x_2^* - 1.279x_3 \) | 4.540   | 4.00           | 0.701 |
| 4      | \( y = -279.80 + 10.017x_1^* + 35.57x_2^* + 1.070x_3 + 5.5803x_4^* \) | 9.290   | 15.98          | 0.866 |
| 5      | \( y = -102.369 + 8.025x_1 + 10.280x_2 + 0.657x_3 + 0.970x_4 + 3.383x_5^* \) | 211.82  | 3.137          | 0.891 |
| 6      | \( y = 180.478 + 9.317x_1^* + 13.349x_2 + 0.400x_3 + 0.484x_4 + 3.420x_5^* - 0.399x_6 \) | 243.33  | 2.67           | 0.990 |
| 7      | \( y = -568.65 + 24.0x_1 + 34.534x_2 + 1.760x_3 + 1.751x_4 + 4.542x_5 + 1.052x_6 + 4558.346.2x_7 \) | 211.88  | 2.65           | 0.991 |

| S. No. | Variables | Partial regression Coefficients (b) | Standard Error (E) | P value |
|--------|-----------|-------------------------------------|---------------------|---------|
| 1      | Maximum temperature | 10.017* | 3.173 | 0.025 |
| 2      | Wind speed | -35.577* | 8.203 | 0.007 |
| 3      | RH (8.30 am) | -1.070 | 2.747 | 0.713 |
| 4      | Minimum temperature | 5.5803* | 1.986 | 0.038 |

*Significant at p ≤ 0.05

Intercept (a) = -279.193

\( X_1 = \) Maximum temperature

\( X_2 = \) Wind speed

\( X_3 = \) Relative humidity (8.30 am)

\( X_4 = \) Minimum temperature

\( X_5 = \) Crop age

\( X_6 = \) Relative humidity (5.30 am)

\( X_7 = \) Rainfall (mm)
Fig. 3 Powdery mildew severity in relation to weather parameters and crop age factors during *rabi*, 2015-16
The severity had a high significant positive correlation with crop age \((r = 0.984)\) and maximum temperature \((r = 0.657)\). Non-significant correlation was observed between severity and rest of the independent variables (Table 4). These observations are in agreement with the findings of Thakur and Agarwal (1995); Solanki et al., 1999; Yarwood (1957); Bhattacharya and Shukla, 2002; Gupta and Sharma, 2009 and Kanzaria et al., 2013. The maximum temperature during the period of occurrence of powdery mildew up to last observation on severity was in the range of 30.9\(^0\)-33.8\(^0\)C) and is well within the favourable range of 28 \(^0\)- 36 \(^0\)C for powdery mildew (Delp, 1954; Schnathorst, 1960; Manners et al., 1963). Hence, the maximum temperature showed a strong positive influence on powdery mildew severity.

Regression analysis with performed by powdery mildew severity as dependent variable and maximum temperature, minimum temperature, morning relative humidity, evening relative humidity, rainfall, wind speed and crop age as independent variables to find out the best fit multiple regression equation by using the coefficients of determination \((R^2)\). Stepwise multiple regression analysis was performed using the following equation:

\[
y = b_0 + b_1x_1 + b_2x_2 + b_3x_3 + \ldots + b_nx_n
\]

Where \(y\) = per cent disease index, \(b_o\) = intercept, \(b_1, b_2, \ldots, b_n\) = regression coefficient, and \(x_1, x_2, \ldots, x_n\) = independent variables. The results were presented in the Table 4.

Multiple regression analysis yielded seven distinct equations with \(R^2\) values ranging from 0.991 to 0.412 (\(P < 0.05\)). However, the best fit equation was obtained in maximum temperature, wind speed, RH (8.30 am), minimum temperature as independent variables (equation 4).

\[
Y = -279.80 + 10.017 (\text{max temp})^* + 35.57 (\text{wind speed})^* + 1.070 (\text{RH morning})^* + 5.5803 (\text{min temp})^* \\
N = 10 \quad R^2 = 0.86 \quad F \text{ value} = 9.29 \quad \text{Standard error} = 15.98
\]

* Significant at 5% level

The best fit equation showed 86.6 per cent role of tested independent variables on powdery mildew severity (Table 5). Results were in accordance with the reports of earlier workers (Solanki et al., 1999; Bhattacharya and Shukla, 2002; Gadre et al., 2002; Gupta and Sharma, 2009; Kanzaria et al., 2013). Similarly, maximum and minimum temperature was favourable for disease development as reported by earlier findings (Yarwood et al., 1957). Wind speed effected an instantaneous dispersal of conidia of \textit{Erysiphe polygoni} which was reported by Hammett and Manners (1974).

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