Original Research Article

Survey on Spot Blotch Severity of Wheat in Northern Parts of Karnataka

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ABSTRACT

Survey and surveillance form the basis for any successful plant protection that depends on early detection of disease followed by timely adoption of management measures. Spot blotch caused by Bipolaris sorokiniana is an important disease of wheat gaining much importance in Karnataka because of the occurrence of severe outbreak every year. Intensive roving survey was conducted in wheat growing areas of Dharwad, Gadag, Belagavi, Bagalkote and Vijayapura districts of Karnataka, during rabi, 2017-18. Results revealed that there was very low severity of spot blotch disease among various districts, taluks, villages surveyed in different wheat growing regions of Karnataka during rabi 2017-18.

Keywords

Spot blotch, Bipolaris sorokiniana, Roving survey, Northern Karnataka

Introduction

Wheat (Triticum spp.; family: Poaceae; centre of origin: Abyssinia) the versatile cereal crop is also described as “the shuffle of life” or “king of cereals”. Even today, it occupies primary position among all the cereal crops due to its feeding the mankind. It supplies more nutrients particularly essential amino acids than any other cereal crop. It has attained a premier position in the world for its unique consumable protein i.e., gluten, which is vital for bread making properties of wheat flour, along with the straw which is a major source of nutritious feed for large population of cattle. Karnataka is unique in wheat cultivation wherein all three cultivated species, viz., *Triticum aestivum* L., *T. durum* Shrank and *T. dicoccum* Desm. are grown in tropical climate, characterized by the prevalence of high temperature during the crop growth. In Karnataka, the area under wheat is about 1.74 lakh ha with an annual production of 1.56 mt having productivity of 897 kg/ha (Anon., 2017).

Due to continuous rise in temperature during the wheat growing season and high humidity coupled with winter rains, spot blotch caused by *Bipolaris sorokiniana* is getting favourable conditions to develop aggressively and cause damage to wheat crop at larger scale by
affecting significant yield loss up to 18-50 per cent under favourable conditions (Duvellier et al., 2005).

*B. sorokiniana* usually induces symptoms on the leaf, sheath and stem but under severe conditions infection may also reach spikes, resulting in low weight, shrivelled grains with black point at the embryo end of kernels (Chand and Joshi, 2004). In Karnataka, about 60 per cent of area is under tetraploid wheat which comprises *T. durum* and *T. dicocucum*. The later one is very susceptible to spot blotch disease. Natural resistance of wheat towards this pathogen is found to be low (Aggarwal et al., 2004). Spot blotch disease is gaining much importance in Karnataka because of the occurrence of severe outbreak every year. It is necessary to undertake survey on spot botch severity of wheat, so that the disease distribution can be understood in order to take up suitable precautionary measures in endemic areas.

### Materials and Methods

Intensive roving survey was conducted in wheat growing areas of Dharwad, Gadag, Belagavi, Bagalkote and Vijayapura districts of Karnataka, during rabi, 2017-18. Wheat fields on the survey route were visited and the observations were recorded as per following format.

| District | Taluk | Village | Variety/ species | Crop stage | Crop grown condition | Leaf blight scoring | Remarks |
|----------|-------|---------|------------------|------------|----------------------|---------------------|---------|

Observations on spot blotch severity was taken using double digit scale (00-99) developed as a modification of Saari and Prescott’s (1975) severity scale as given below:

**The scale (0-9) used for scoring spot blotch severity on leaves**

| Per cent leaf area coverage | Scale | Per cent leaf area coverage | Scale |
|-----------------------------|-------|-----------------------------|-------|
| 0                           | 0     | 50                          | 5     |
| 10                          | 1     | 60                          | 6     |
| 20                          | 2     | 70                          | 7     |
| 30                          | 3     | 80                          | 8     |
| 40                          | 4     | 90                          | 9     |

During survey spot blotch infected leaf samples were collected from different locations as mentioned in Table 1.

### Results and Discussion

Survey on the severity of disease helps to gather information on prevalence, severity and distribution of the disease, pathogen diversity in particular agro-climatic zone. It reveals magnitude of the problem on hand and serves as a precursor for evolving the management strategies. The roving survey was carried out in Dharwad, Gadag, Belagavi, Bagalkote and Vijayapura districts of northern Karnataka during rabi 2017-18 to assess the status of wheat spot blotch severity under field conditions. In each district various taluks and villages were surveyed and the results pertaining to this survey were presented in Table 2.
Table 1: Isolates of *Bipolaris sorokiniana* collected from different wheat growing areas

| Sl. No | State     | District | Village/ Research stations                                                                 | Varieties                                      | Agro-ecological zone (AEZ) |
|--------|-----------|----------|-------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------------|
| 1      | Karnataka | Dharwad  | Main Agricultural Research Station, University of Agricultural Sciences, Dharwad- 580005 | Amruth, Bijaga yellow, Jyothi, IBDSN 140      | Peninsular Zone (PZ)        |
| 2      | Belagavi  |          | Jaikoppa, Ugar, Agricultural Research Station, Arbhavi, Gokak                              | DWR 39, Local dicocum, DDK 5027, DWR 162      |                             |
| 3      | Bagalkote |          | Agricultural Research Station, Bagalkote, Mudhol, Shindogi                                 | UAS 415, BW (Mudhol), Keerthi                   |                             |
| 4      | Maharashtra | Pune  | Hole farm, Baramati                                                                         | N-2 305, N-2 316                              | Peninsular Zone (PZ)        |
| 5      | Nashik    |          | Agricultural Research Station, Niphad                                                        | NIAW 1994                                     |                             |

Table 2: Survey on spot blotch severity of wheat in northern parts of Karnataka during rabi 2017-18

| District/ Date of Survey | Taluk   | Village       | GPS Latitude (N) | GPS Longitude (E) | Elevation (m) | Variety/species | Crop grown condition | Stage of the crop | Leaf blight (DD) | Remarks (Other pests/ diseases observed) |
|--------------------------|---------|---------------|------------------|-------------------|---------------|-----------------|----------------------|-------------------|----------------|----------------------------------------|
| Dharwad 22.12.2017       | Dharwad | Mangalagatti  | 1532.833         | 07457.836         | 687           | BW              | RF                   | Boot leaf         | 01            | -                                      |
|                          |         | Kurubagatti   | 1534.321         | 07457.996         | 674           | Bijaga Yellow   | RF                   | Flowering          | 01            | Foot rot                               |
|                          |         | Lokur         | 1535.420         | 07450.556         | 662           | DWR 2006       | RF                   | Boot leaf         | 01            | Foot rot                               |
|                          |         | Lokur         | 1534.989         | 07458.052         | 654           | Amruth          | RF                   | Boot leaf         | 00            | Termites                               |
|                          |         | Lokur         | 1534.966         | 07457.940         | 658           | BW              | RF                   | Boot leaf         | 00            | Termites                               |
|                          |         | Garag         | 1535.353         | 07457.010         | 649           | DWR 2006       | RF                   | Flowering          | 00            | -                                      |
|                          |         | Tadakod       | 1536.135         | 07454.573         | 677           | Amruth          | RF                   | Flowering          | 00            | Leaf rust                              |
|                          |         | Budarakatti   | 1538.854         | 07455.076         | 696           | Amruth          | RF                   | Flowering          | 00            | Foot rot                               |
| Dharwad 28.12.2017       | Hubballi | Rayapur       | 1542.804         | 07504.123         | 692           | Amruth          | RF                   | Flowering          | 00            | Termites, Stem borer                   |
|                          |         | Rayapur       | 1525.432         | 07504.005         | 678           | Amruth          | RF                   | Flowering          | 00            | -                                      |
|                          |         | Sainagar      | 1523.034         | 07507.446         | 658           | Amruth          | RF                   | Flowering          | 00            | -                                      |
|                          |         | Bommapur      | 1521.694         | 07512.729         | 638           | Amruth          | RF                   | Flowering          | 00            | Foot rot                               |
|                          |         | Shiraguppi    | 1521.843         | 07514.006         | 625           | Amruth          | RF                   | Flowering          | 00            | -                                      |

* DD: Double digit scale, RF: Rainfed, IR: Irrigated, RI: Restricted irrigation, BW: Bread wheat, DW: Durum wheat

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| District/ Date of Survey | Taluk     | Village    | GPS Latitude (N) | GPS Longitude (E) | Elevation (m) | Variety/species | Crop grown condition | Stage of the crop | Leaf blight (DD) | Remarks (Other pests/diseases observed) |
|--------------------------|-----------|------------|------------------|-------------------|--------------|----------------|----------------------|------------------|-----------------|------------------------------------------|
| Dharwad 28.12.2017      | Navalgund | Shiraguppi | 1521.884         | 07515.394         | 602          | Amruth         | RF                   | Flowering         | 00              | -                                         |
|                          | Basapur   | Shiraguppi | 1521.748         | 07516.951         | 596          | Amruth         | RF                   | Flowering         | 00              | -                                         |
|                          |           | Narawadi   | 1521.723         | 07518.639         | 594          | Amruth         | RI                   | Flowering         | 00              | Leaf rust                                |
|                          | Arekurahatti |          | 1529.110         | 07523.030         | 605          | Amruth         | RI                   | Flowering         | 00              | Stem borer                               |
| Gadag 28.12.2017        | Gadag     | Annigeri   | 1524.593         | 07524.900         | 617          | DW             | RF                   | Flowering         | 00              | -                                         |
| Belagavi 22.12.2017     | Bailhongal| Jalikoppa  | 1544.441         | 07452.654         | 645          | BW             | IR                   | Boot leaf         | 01              | -                                         |
|                          | Nayanagar | 1546.246   | 07452.187        |                   | 652          | BW             | IR                   | Boot leaf         | 00              | -                                         |
|                          | Murakumbi | 1551.863   | 07454.507        |                   | 693          | BW             | RF                   | Flowering         | 00              | -                                         |
|                          | Muragod   | 1553.411   | 07455.542        |                   | 719          | BW             | RF                   | Flowering         | 00              | -                                         |
| Belagavi 22.12.2017     | Gokak     | Maladinni  | 1608.307         | 07452.469         | 559          | BW             | IR                   | Flowering         | 00              | -                                         |
| Belagavi 22.12.2017     | Athani    | Ugar       | 1638.528         | 07449.724         | 535          | Trials         | IR                   | Tillering         | 00              | -                                         |
| District/Date of Survey | Taluk   | Village          | GPS         | Elevation (m) | Variety/species | Crop grown condition | Stage of the crop | Leaf blight (DD) | Remarks (Other pests/diseases observed) |
|-------------------------|---------|------------------|-------------|---------------|-----------------|----------------------|-------------------|-----------------|-----------------------------------------|
| Dharwad 06.01.2018      | Dharwad | Hebballi/Govanakopp | 1527.881    | 07504.213     | DW              | RI                   | Flowering          | 00              | Leaf rust                              |
|                         |         | Shivalli         | 1527.467    | 07509.762     | Amruth          | RF                   | Flowering          | 00              | Leaf rust                              |
|                         | Hubballi| Dandikoppa       | 1527.234    | 07514.593     | Amruth          | IR                   | Flowering          | 00              | Leaf rust                              |
|                         | Navalgund| Navalgund      | 1533.862    | 07522.267     | Ankur           | IR                   | Flowering          | 00              | Leaf rust, Termites                    |
| Gadag 06.01.2018        | Navalgund| Navalgund      | 1533.854    | 07522.264     | Amruth          | IR                   | Flowering          | 00              | Leaf rust                              |
| Bagalkote 06.01.2018    | Nargund | Bhairanahalli    | 1545.000    | 7525.851      | DWR 162         | IR                   | Flowering          | 00              | -                                      |
|                         | Badami  | Govanakopp       | 1552.749    | 7529.887      | DWR 162         | IR                   | Flowering          | 00              | -                                      |
|                         | Bagalkote| Bagalkote      | 1610.248    | 7541.911      | DWR 162         | IR                   | Flowering          | 00              | -                                      |
|                         | Sunaga  | 1618.350         | 7538.065    | 554           | DWR 162         | IR                   | Flowering          | 00              | -                                      |
|                         | Bilagi  | Goyanadinni      | 1622.786    | 7539.823      | BW              | IR                   | Flowering          | 00              | -                                      |
| Vijayapura 06.01.2018   | Vijayapura| Ronihal        | 1632.140    | 07541.423     | DWR 162         | IR                   | Flowering          | 00              | -                                      |
|                         | Mulawad | 1637.275         | 07543.919   | 626           | BW              | RF                   | Flowering          | 00              | -                                      |
|                         | Honaganahalli| Honaganahalli | 1639.608    | 7543.922      | Bansi           | RF                   | Flowering          | 00              | -                                      |
| District/Date of Survey | Taluk     | Village   | GPS Latitude (N) | GPS Longitude (E) | Elevation (m) | Variety/species | Crop condition | Stage of the crop | Leaf blight (DD) | Remarks (Other pests/diseases observed) |
|-------------------------|-----------|-----------|------------------|-------------------|---------------|-----------------|----------------|-------------------|-----------------|-----------------------------------------|
| Dharwad 24.01.2018      | Dharwad   | Kavalgeri | -                | -                 | -             | DW              | RF             | Flowering          | 00              | Leaf rust                              |
|                         | Marewad   | -         | 1531.855         | 07503.064         | 665           | BW              | RF             | Milky             | 00              | Leaf rust                              |
|                         | Karadigudda | -         | 1534.272         | 07501.805         | 696           | DW              | IR             | Flowering          | 00              | Leaf rust                              |
|                         | UppinBetageri | -         | 1536.267         | 0700.526          | 625           | DW              | RI             | Flowering          | 00              | Leaf rust                              |
| Belagavi 24.01.2018     | Bailhongal | Jalikoppa | 1544.451         | 07452.670         | 637           | DWR 39          | IR             | Milky             | 00              | Leaf rust                              |
|                         | Nayanagar | -         | 1546.220         | 07452.188         | 656           | BW (KW 51)      | IR             | Milky             | 00              | Leaf rust                              |
|                         |           |           |                  |                   |               |                 |                |                   |                 |                                         |
| Saundatti               |           | Murgod    | 1553.416         | 07455.540         | 721           | BW              | RI             | Milky             | 00              | Leaf rust                              |
|                         |           | Halaki    | 1555.856         | 07456.202         | 725           | BW              | IR             | Flowering          | 00              | Leaf rust                              |
|                         |           | Yaragatti | 1600.752         | 07500.011         | 654           | DIC             | IR             | Flowering          | 00              | -                                       |
| Gokak                   |           | Maladinni | 1607.405         | 07453.501         | 562           | BW              | IR             | Flowering          | 00              | Leaf rust                              |
|                         |           | Maladinni | 1608.331         | 07452.474         | 558           | BW              | IR             | Flowering          | 00              | Leaf rust                              |
|                         |           | ByaliBasappa | 1613.150       | 07450.381         | 563           | DWR 162         | IR             | Flowering          | 00              | Leaf rust                              |
| Hukkeri                 |           | Rakshi    | 1614.311         | 07438.172         | 653           | BW              | RI             | Flowering          | 00              | -                                       |
|                         |           | Hukkeri   | 1614.288         | 07436.572         | 653           | BW              | IR             | Flowering          | 00              | -                                       |
|                         |           | Sankeshwar | 1616.002        | 07428.100         | 651           | BW              | IR             | Flowering          | 00              | -                                       |
| District/ Date of Survey | Taluk       | Village      | GPS Latitude (N) | GPS Longitude (E) | Elevation (m) | Variety/species | Crop grown condition | Stage of the crop | Leaf blight (DD) | Remarks (Other pests/ diseases observed) |
|--------------------------|-------------|--------------|------------------|-------------------|---------------|-----------------|---------------------|-------------------|-----------------|------------------------------------------|
| Dharwad 09.02.2018       | Dharwad     | Kavalgeri    | 1529.874         | 07501.873         | 686           | BW              | IR                  | Milky             | 00              | Leaf rust                                |
|                          |             | Amminbhavi   | 1532.694         | 07503.722         | 647           | DWR 162         | IR                  | Flowering          | 00              | Leaf rust                                |
|                          |             | Harobelavadi | 1536.948         | 07504.150         | 619           | Amruth          | RF                  | Flowering          | 00              | Leaf rust                                |
| Belagavi 09.02.2018      | Saundatti   | Inamhongal   | 01538.098        | 07504.536         | 622           | BW              | RF                  | Flowering          | 00              | Leaf rust                                |
|                          | Saundatti   | 01544.586    | 07506.659        |                   | 660           | DWR 162         | IR                  | Flowering          | 00              | Leaf rust                                |
|                          | Goravanakolla | 01546.882   | 07508.424        |                   | 658           | DWR 162         | IR                  | Flowering          | 00              | Leaf rust                                |
|                          | Goravanakolla | 01546.882   | 07508.424        |                   | 658           | DWR 162         | IR                  | Flowering          | 00              | Leaf rust                                |
|                          | Benakatti   | 01553.935    | 07504.597        |                   | 619           | DWR 162         | IR                  | Flowering          | 00              | Leaf rust                                |
|                          | Benakatti   | 01553.935    | 07504.597        |                   | 619           | DWR 162         | IR                  | Flowering          | 00              | Leaf rust                                |
|                          | Jevapur     | 01556.950    | 07502.178        |                   | 662           | DWR 162         | RI                  | Flowering          | 00              | Leaf rust                                |
|                          | Jevapur     | 01556.950    | 07502.178        |                   | 662           | DWR 162         | RI                  | Flowering          | 00              | Leaf rust                                |
| Ramdurg                  | Soplad      | 01601.031    | 07504.752        |                   | 648           | BW              | IR                  | Flowering          | 00              | Leaf rust                                |
|                          | Salahalli   | 01604.006    | 07512.674        |                   | 639           | DWR 162         | IR                  | Flowering          | 00              | Leaf rust                                |
|                          | Mudhol      | 01607.377    | 07518.384        |                   | 629           | BW              | IR                  | Milky             | 00              | Leaf rust                                |
| District/ Date of Survey | Taluk | Village    | GPS Latitude (N) | GPS Longitude (E) | Elevation (m) | Variety/ species | Crop grown condition | Stage of the crop | Leaf blight (DD) | Remarks (Other pests/ diseases observed) |
|--------------------------|-------|------------|------------------|-------------------|---------------|------------------|---------------------|-------------------|----------------|------------------------------------------|
| Bagalkote 09.02.2018     | Mudhol| Lokapur    | 01609.236        | 07521.144         | 572           | BW               | IR                  | Flowering          | 00              | Leaf rust                                |
|                         |       | Hebbal     | 01612.865        | 07521.103         | 529           | BW               | IR                  | Milky             | 00              | -                                        |
| Bagalkote 09.02.2018     | Mudhol| Jergal     | 01617.194        | 07518.879         | 535           | BW               | IR                  | Flowering          | 00              | Leaf rust                                |
|                         |       | Shirol     | 01623.768        | 07516.550         | 566           | Keerti, DWR 162  | IR                  | Flowering          | 00              | Leaf rust                                |
| Jamakandi                |       | Madarkhandi| 01630.104        | 07513.962         | 565           | BW               | IR                  | Flowering          | 00              | Leaf rust                                |
|                         |       | Yellatti   | 01629.595        | 07509.856         | 537           | BW               | IR                  | Flowering          | 00              | Leaf rust                                |
|                         |       | Rabakavi   | 1628.176         | 07507.690         | 546           | BW               | IR                  | Flowering          | 00              | Leaf rust                                |
|                         |       | Rabakavi   | 1628.176         | 07507.690         | 546           | BW               | IR                  | Flowering          | 00              | Leaf rust                                |
| Bagalkote 09.02.2018     | Mudhol| Mahalingpur| 01624.700        | 07506.489         | 591           | BW               | IR                  | Flowering          | 00              | Leaf rust                                |
|                         |       | Mahalingpur| 01624.700        | 07506.489         | 591           | BW               | IR                  | Flowering          | 00              | Leaf rust                                |
|                         |       |              |                  |                   |               |                  |                     |                   |                 |                                          |
| Belagavi 09.02.2018      | Ramdurg| Rankalkoppa| 01556.520        | 07517.352         | 570           | BW               | IR                  | Flowering          | 00              | Leaf rust                                |
|                         | Saundatti| Kallapur   | 01551.573        | 07515.828         | 610           | DWR 162          | IR                  | Flowering          | 00              | Leaf rust                                |
Table 3 Monthly meteorological data of Dharwad, Belagavi, Bagalkote, Gadag and Vijayapura districts of rabi 2016-17, 2017-18

| District   | Month          | Temperature (°C) | Rainfall (mm) | Relative humidity (%) |
|------------|----------------|------------------|---------------|-----------------------|
|            |                | Maximum | Minimum | Average | Maximum | Minimum | Average | Maximum | Minimum | Average |
| Dharwad    | October, 2016  | 34.20    | 15.50   | 24.88   | 12.00   | 0.00    | 22.13   | 100     | 21.92   | 70.12   |
|           | October, 2017  | 33.00    | 18.60   | 25.63   | 69.00   | 0.00    | 123.53  | 100     | 30.50   | 80.32   |
|           | November, 2016 | 33.70    | 13.20   | 24.38   | 6.00    | 0.00    | 10.44   | 100     | 14.20   | 52.80   |
|           | November, 2017 | 33.60    | 14.30   | 24.63   | 4.00    | 0.00    | 5.95    | 100     | 26.00   | 66.76   |
|           | December, 2016 | 32.70    | 13.50   | 23.84   | 0.00    | 0.00    | 0.17    | 100     | 11.70   | 50.93   |
|           | December, 2017 | 32.10    | 15.20   | 23.99   | 0.00    | 0.00    | 0.56    | 100     | 27.10   | 64.56   |
|           | January, 2017  | 33.00    | 12.00   | 23.79   | 0.00    | 0.00    | 0.00    | 94.20   | 13.40   | 49.24   |
|           | January, 2018  | 34.20    | 13.70   | 24.22   | 0.00    | 0.00    | 0.00    | 100     | 20.40   | 53.87   |
|           | February, 2017 | 38.00    | 16.00   | 26.37   | 0.00    | 0.00    | 0.00    | 100     | 10.60   | 47.15   |
|           | February, 2018 | 35.40    | 15.30   | 25.44   | 0.00    | 0.00    | 0.65    | 100     | 6.60    | 43.91   |
|           | March, 2017    | 39.20    | 19.20   | 29.24   | 0.00    | 0.00    | 0.58    | 100     | 8.40    | 51.11   |
|           | March, 2018    | 37.90    | 16.90   | 28.10   | 0.00    | 0.00    | 0.00    | 100     | 11.40   | 55.29   |
| Belagavi   | October, 2016  | 29.20    | 15.20   | 22.59   | 18.50   | 0.00    | 33.83   | 99.40   | 30.50   | 69.71   |
|           | October, 2017  | 30.50    | 17.40   | 24.50   | 47.50   | 0.00    | 85.33   | 94.60   | 26.50   | 71.18   |
|           | November, 2016 | 30.50    | 12.70   | 21.89   | 11.00   | 0.00    | 10.74   | 99.20   | 21.30   | 57.63   |
|           | November, 2017 | 30.80    | 14.40   | 23.33   | 0.00    | 0.00    | 2.29    | 89.20   | 28.50   | 60.10   |
|           | December, 2016 | 29.00    | 10.00   | 21.26   | 0.50    | 0.00    | 0.56    | 94.10   | 17.10   | 56.59   |
| District        | Month          | Temperature (°C) | Rainfall (mm) | Relative humidity (%) |
|-----------------|----------------|------------------|---------------|-----------------------|
|                 |                | Maximum | Minimum | Average | Maximum | Minimum | Average | Maximum | Minimum | Average |
|                 |                | Maximum | Minimum | Average | Maximum | Minimum | Average | Maximum | Minimum | Average |
|                 |                | 29.30   | 13.00   | 21.95   | 1.50    | 0.00    | 1.53    | 90.90   | 23.50   | 58.29   |
| December, 2017  |                | 29.10   | 12.10   | 21.48   | 0.00    | 0.00    | 0.00    | 88.90   | 20.70   | 55.25   |
| January, 2017   |                | 29.80   | 13.90   | 22.28   | 0.00    | 0.00    | 0.00    | 90.80   | 21.70   | 54.99   |
| February, 2017  |                | 32.80   | 15.30   | 23.96   | 0.00    | 0.00    | 0.00    | 91.60   | 15.10   | 47.33   |
| February, 2018  |                | 32.30   | 14.50   | 23.94   | 0.00    | 0.00    | 0.00    | 89.60   | 8.00    | 43.48   |
| March, 2017     |                | 34.50   | 12.20   | 25.11   | 0.00    | 0.00    | 0.90    | 91.90   | 13.30   | 48.95   |
| March, 2018     |                | 35.70   | 17.90   | 26.04   | 0.00    | 0.00    | 0.00    | 89.90   | 11.20   | 47.85   |
| Bagalkote       | October, 2016  | 30.30   | 13.20   | 22.39   | 3.50    | 0.00    | 4.15    | 83.90   | 9.30    | 51.82   |
| October, 2017   |                | 33.60   | 16.90   | 27.06   | 29.00   | 0.00    | 146.94  | 99.90   | 38.20   | 77.77   |
| November, 2016  |                | 30.50   | 9.90    | 20.66   | 0.00    | 0.00    | 0.09    | 80.40   | 4.90    | 44.16   |
| November, 2017  |                | 33.60   | 14.90   | 24.84   | 0.50    | 0.00    | 4.31    | 97.90   | 33.70   | 68.51   |
| December, 2016  |                | 29.40   | 8.40    | 19.97   | 0.00    | 0.00    | 0.00    | 77.70   | 2.00    | 45.90   |
| December, 2017  |                | 33.20   | 11.30   | 23.53   | 2.00    | 0.00    | 1.36    | 98.20   | 33.10   | 67.49   |
| January, 2017   |                | 33.80   | 9.10    | 21.71   | 0.00    | 0.00    | 0.00    | 93.30   | 14.40   | 55.27   |
| January, 2018   |                | 34.50   | 12.60   | 23.65   | 0.00    | 0.00    | 0.00    | 98.70   | 28.50   | 63.53   |
| February, 2017  |                | 36.80   | 12.70   | 25.28   | 0.00    | 0.00    | 0.00    | 92.80   | 15.80   | 54.91   |
| February, 2018  |                | 38.00   | 15.40   | 26.36   | 0.00    | 0.00    | 0.00    | 78.70   | 0.80    | 37.80   |
| March, 2017     |                | 40.20   | 14.60   | 28.75   | 0.00    | 0.00    | 0.01    | 90.60   | 14.00   | 50.55   |
| March, 2018     |                | 40.50   | 17.90   | 29.29   | 1.00    | 0.00    | 1.25    | 93.90   | 16.50   | 52.17   |
| District   | Month       | Temperature (°C) | Rainfall (mm) | Relative humidity (%) |
|-----------|-------------|------------------|---------------|-----------------------|
|           |             | Maximum | Minimum | Average | Maximum | Minimum | Average | Maximum | Minimum | Average |
| Gadag     | October, 2016 | 30.50   | 4.60    | 24.37    | 0.00    | 0.00    | 0.00    | 96.80   | 13.70   | 54.84   |
|           | October, 2017 | 32.50   | 6.60    | 27.37    | 32.00   | 0.00    | 98.27   | 98.80   | 37.50   | 77.30   |
|           | November, 2016 | 30.30  | 11.90   | 24.63    | 0.00    | 0.00    | 0.08    | 88.10   | 14.50   | 41.06   |
|           | November, 2017 | 33.30  | 14.80   | 25.82    | 0.00    | 0.00    | 1.58    | 88.60   | 14.50   | 42.06   |
|           | December, 2016 | 29.50  | 17.30   | 24.76    | 4.50    | 0.00    | 1.96    | 78.20   | 10.30   | 41.63   |
|           | December, 2017 | 33.00  | 11.50   | 23.58    | 1.40    | 0.00    | 1.43    | 88.88   | 14.86   | 43.80   |
|           | January, 2017   | 30.90  | 14.50   | 24.21    | 0.00    | 0.00    | 0.15    | 77.20   | 17.70   | 38.03   |
|           | January, 2018   | 33.70  | 14.90   | 24.46    | 0.00    | 0.00    | 0.00    | 81.60   | 12.30   | 40.80   |
|           | February, 2017   | 34.30  | 14.60   | 24.83    | 0.00    | 0.00    | 0.00    | 86.80   | 8.60    | 33.52   |
|           | February, 2018   | 35.10  | 17.20   | 26.48    | 9.50    | 0.00    | 2.80    | 66.40   | 10.00   | 35.00   |
|           | March, 2017      | 36.90  | 14.60   | 25.73    | 0.00    | 0.00    | 0.00    | 94.20   | 4.10    | 45.30   |
|           | March, 2018      | 39.70  | 19.20   | 28.96    | 9.00    | 0.00    | 38.30   | 87.80   | 10.00   | 40.11   |
| Vijayapura | October, 2016   | 32.20  | 16.60   | 25.10    | 4.00    | 0.00    | 5.50    | 100     | 25.40   | 65.94   |
|           | October, 2017   | 32.60  | 18.20   | 26.42    | 21.50   | 0     | 89.00   | 100     | 31.30   | 77.37   |
|           | November, 2016  | 33.30  | 14.10   | 23.80    | 0.00    | 0.00    | 0.00    | 99.50   | 14.90   | 48.81   |
|           | November, 2017  | 32.80  | 15.20   | 24.32    | 22.50   | 0.00    | 22.50   | 100     | 26.80   | 61.12   |
|           | December, 2016  | 32.50  | 13.10   | 23.30    | 0.00    | 0.00    | 0.00    | 100     | 11.70   | 50.57   |
|           | December, 2017  | 31.10  | 15.50   | 22.80    | 15.50   | 0.00    | 15.50   | 100     | 25.20   | 60.11   |
|           | January, 2017   | 33.00  | 13.00   | 23.32    | 0.00    | 0.00    | 0.00    | 90.90   | 13.50   | 45.70   |
|           | January, 2018   | 33.10  | 14.10   | 23.74    | 0.00    | 0.00    | 0.00    | 89.00   | 18.70   | 48.47   |
|           | February, 2017  | 37.40  | 17.40   | 26.31    | 0.00    | 0.00    | 0.00    | 76.80   | 10.30   | 35.83   |
|           | February, 2018  | 35.00  | 15.40   | 25.36    | 0.00    | 0.00    | 0.00    | 75.70   | 10.00   | 39.00   |
|           | March, 2017     | 40.50  | 14.50   | 28.70    | 0.00    | 0.00    | 0.00    | 100     | 9.70    | 30.18   |
|           | March, 2018     | 39.20  | 18.30   | 28.69    | 7.00    | 0.00    | 8.50    | 97.70   | 12.00   | 42.23   |
Dharwad district

Among various taluks viz., Dharwad, Hubballi and Navalgund taluk surveyed within Dharwad district, only two villages in Dharwad taluk viz., mangalagatti and kurubagati had scoring of 01 for spot blotch disease.

The first digit 0 indicates that flag leaf has zero per cent disease and second digit 1 means flag-1 leaf has 10 per cent disease. The rest of the villages under Dharwad, Hubballi and Navalgund taluks had 00 scoring which means no appearance of spot blotch.

Gadag district

Gadag, Navalgund and Nargund taluks were surveyed in this district. Among various villages surveyed within each taluk viz., Annigeri village within Gadag taluk, Navalgund village in Navalgund taluk and Bhairanahalli village in Nargund taluk none of the villages had spot blotch disease.

Belagavi district

Bailhogal, Gokak, Athani, Saundatti, HukkkeriRamdurg and Mudhol taluks were surveyed in this district.

Among various villages surveyed within each taluk viz., Murakumbi, Muragod, Jalikoppa and Nayanagar villages within Bailhongal taluk, Maladinni, ByaliBasappa villages within Gokak taluk, Ugarkhurd village within Athani taluk, Murgod, Halaki, Yaragatti and Kallapur villages within Saundatti taluk, Rakshi, Hukkeri and Sankeshwar villages within Hukkkeri taluk, Soplad, Salahalli and Rankalkoppa villages within Ramdurg taluk, Dadanatti village within Mudhol taluk none of the villages had spot blotch disease. All villages had 00 scoring indicating absence of spot blotch.

Bagalkote district

Badami, Bagalkote, Bilagi, Mudhol and Jamakand taluks were surveyed in this district.

Among various villages surveyed within each taluk viz., Govanakoppa village in Badami taluk, Bagalkote and Sunaga villages in Bagalkote taluk, Goyanadinni village in Bilagi taluk, Lokapur, Hebbal, Jergal, Shirol, Madarkhandi, Mahalingpur, Rannabelagali, Mudhol and Lakshanatti villages in Mudhol taluk, Yellatti and Rabakavi villages in Jamakand taluk none of the villages had spot blotch disease.

Vijayapura district

Vijayapura taluk was surveyed in this district. Among various villages surveyed within Vijayapura taluk viz., Ronihal, Mulawad and Honaganahalli none of the villages had spot blotch disease.

Overall survey results revealed that there was very low severity of spot blotch disease among various districts, taluks, villages surveyed in different wheat growing regions of Karnataka during rabi 2017-18. The reason for the low appearance of spot blotch disease in different districts surveyed during rabi 2017-18 may be correlated with weather parameters like temperature, relative humidity and rainfall (Table 3). There was variation in maximum monthly temperature and average relative humidity of October, November and December months of 2017 when compared to October, November, December months of 2016. These variations in temperature, relative humidity may not be congenial for pathogen development and expression of various symptoms of the disease. Such variations in the disease severity have also been observed by earlier workers (Patil, 2000; Meli 1993).
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