



## Screening of sunflower genotypes against sunflower leaf curl disease under field conditions

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### Abstract

Sunflower leaf curl disease is an emerging constraint to sunflower production, causing yield loss up to 82.80 per cent under severe conditions. Identification of resistant or moderately resistant genotypes is an important of an effective management strategy. The present study was conducted to screen sunflower genotypes against sunflower leaf curl disease under field conditions during *rabi* 2025-26 at the Main Agricultural Research Station (MARS), University of Agricultural Sciences, Raichur, Karnataka. The experimental material consists of 26 genotypes along with susceptible check KBSH - 44. Of these, none of the genotypes were found either highly resistant or resistant. However, four genotypes recorded a moderately resistant reaction viz., CMS-112B, CMS-135B, RCMS-38B and RSFH-700 recorded moderately resistant reaction, nine showed moderately susceptible reaction viz., RCMS-103B, RCMS-104B, RCMS-105B, CMS-1103B, NDCMS-4B, CMS-76B, RCMS-225B, RSFH-719 and RSFH-124, while twelve genotypes showed susceptible reaction. The genotype R-127-1 recorded highly susceptible reaction for sunflower leaf curl disease.

**Keywords:** Sunflower, sunflower leaf curl disease and screening

### Introduction

Sunflower (*Helianthus annuus* L.) is one of the important edible oilseed crops grown throughout the world for its high-quality oil. In terms of global significance, it is considered next to soybean and groundnut among the major oilseed crops. It is popularly known to called as “Surajmukhi” belongs to the family “Asteraceae”. The name sunflower is derived from Greek word “Helios” means Sun and “Anthois” means flower. It is originated in North America. Sunflower oil is a rich source of linoleic acid (64 %) which helps in washing out cholesterol deposition in the coronary arteries of the heart and is therefore considered beneficial for heart patients. In India it is majorly cultivated in Karnataka, Andhra Pradesh, Maharashtra and Tamil Nadu. In India, sunflower was cultivated over an area of 1.94 lakh hectares, with a total production of 2.36 lakh tonnes and an average productivity of 1,214 kg ha<sup>-1</sup> during 2024-25. In Karnataka, sunflower occupied 1.02 lakh hectares, producing 1.05 lakh tonnes with an average productivity of 1,023 kg ha<sup>-1</sup> (Anon., 2025).

Although area under crop cultivation increased with the advent of new sunflower commercial hybrids and their wider adoptability to diverse agroclimatic conditions with low economic investment by farmers in plant protection measures, the crop has been found suffering from many diseases like *Alternaria* leaf spot, downy mildew, powdery mildew, charcoal rot, scleorotium rot or wilt, rhizopus, head rot and sunflower necrosis virus (Saharan *et al.*, 2005)<sup>[5]</sup>.

During the field screening, sunflower plants showing leaf curl disease symptoms were observed. The characteristic symptoms viz., upward curling of leaves, cupping of leaves, vein thickening with enations, vein clearing, leathery of leaves, chlorosis of bracts, severe curling of leaves, reduction in head size and stunted growth.

Host plant resistance is one of the most effective strategies for managing the virus diseases. In sunflower leaf curl disease transmitted by vector *B. tabaci* is emerging as a serious threat to sunflower production in Karnataka and other parts of India. Therefore, identification and screening of resistant or tolerant sunflower genotypes under field conditions is essential.

### Material and methods

The field experiment was conducted during *rabi*, 2025-26 at the Main Agricultural Research Station (MARS), University of Agricultural Sciences (UAS), Raichur, Karnataka, India. The experimental location is situated in a semi-arid tropical region with black cotton soils.

The experimental material consists of 26 genotypes along with susceptible check KBSH – 44 were evaluated under field conditions. The genotypes were sown on 15-December-2025 and evaluated in two replications in single row of length 4.2 m with spacing of 60 x 30 cm. Observations on sunflower leaf curl disease were recorded at 30, 60 and 90 days after sowing (DAS). All the recommended agronomical practices were followed throughout the crop growing period. Disease incidence was recorded at 15 days interval starting from the appearance of disease symptoms. Based on the disease incidence values, the sunflower genotypes were categorized into resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible groups. Disease incidence was calculated using the formula. (Table 1).

$$\text{Disease incidence (\%)} = \frac{\text{Number of infected plants}}{\text{Total number of plants}} \times 100$$

**Table 1:** Disease scale for SuLCV disease (Maruthi *et al.*, 2003)<sup>[3]</sup>

| Scale | Disease incidence (%) | Description of symptoms                                             | Disease reaction       |
|-------|-----------------------|---------------------------------------------------------------------|------------------------|
| 0     | 0-1                   | No symptoms                                                         | Highly resistant       |
| 1     | 1.1-5                 | Vein clearing, light yellowing along leaf margin but no curling     | Resistant              |
| 2     | 5.1-10                | Vein thickening, enations, upward curling of leaves                 | Moderately resistant   |
| 3     | 10.1-25               | Reduced size of the leaves and flower buds                          | Moderately susceptible |
| 4     | 25.1-50               | Severe leaf curling, puckering and stunted growth                   | Susceptible            |
| 5     | Above 50              | Severe stunting, no earhead formation and bushy appearance of plant | Highly susceptible     |

### Results and Discussion

At 30 DAS, disease incidence among the listed genotypes ranged from 0.00 to 30.00 per cent. The maximum disease incidence was recorded in CMS-34B (30.00 %), followed by R-127-1 (21.40 %) and KBSH-44 (21.42 %). Several genotypes, including RCMS-104B, CMS-112B, CMS-135B, RCMS-38B, CMS-1103B, NDCMS-2B, RCMS-76B and RCMS-225B, recorded 0.00 disease incidence (Table 2).

At 60 DAS, disease incidence increased in most of the genotypes and ranged from 0.00 to 47.14 per cent. The maximum disease incidence was recorded in R-127-1 (47.14 %), followed by CMS-17B (42.88 %) and CMS-34B (40.00 %). The susceptible check KBSH-44 recorded 28.57 per cent disease incidence (Table 2).

At 90 DAS, further progression of disease was observed, with disease incidence ranging from 8.65 to 52.42 per cent. The maximum disease incidence was recorded in R-127-1 (52.42 %), followed by CMS-34B (50.00 %). The susceptible check KBSH-44 recorded 40.28 per cent disease incidence. The minimum disease incidence was recorded in CMS-112B (8.65 %) followed by RSFH-700 (9.00 %) (Table 2).

Out of 26 genotypes screened (Table 2) at MARS Raichur none of the genotypes were found either highly resistant or resistant. However, four genotypes viz., CMS-112B, CMS-135B, RCMS-38B and RSFH-700 recorded moderately resistant reaction by recording less than 10 per cent disease incidence, whereas the maximum disease incidence of 40.28 per cent was recorded in susceptible check *i.e* KBSH-44. Nine genotypes recorded moderately susceptible reaction viz., RCMS-103B, RCMS-104B, RCMS-105B, CMS-1103B, NDCMS-4B, RCMS-76B, RCMS-225B, RSFH-719 and RSFH-124. Further 12 genotypes recorded susceptible reaction viz., RCMS-107B, CMS-249B, CMS-335B, CMS-1B, CMS-8B, CMS-9B, NDCMS-2B, CMS-17B, CMS-

34B, RCMS-96B, RCMS-98B and RSFH-33. Whereas R-127-1 shows highly susceptible reaction for sunflower leaf curl disease (Plate 1 and Table 3).

Similarly, significant variation in disease response was observed by Deepa (2013)<sup>[2]</sup> screened 36 sunflower genotypes under epiphytotic field conditions for their resistance against sunflower leaf curl disease. Genotype viz., RSFH-1887, DRSH-1, RSFH-10-600 and NSFH-1009 recorded moderately resistance. Further eight hybrids recorded moderately susceptible reaction and they are NDSH-11, SVSH-478, LSFH-234, KBSH-1, Sunshine, PAC-339 and NDSH-12. The hybrids NSSH-1201, PSFH-18, PKVSH-592, NSSH-1084, LSFH-176, VSFH-2043, PAC-3794 and CSFH-8031 were found susceptible to the disease.

Venkataramanamma *et al.* (2026)<sup>[6]</sup> evaluated twenty-three sunflower lines were screened against sunflower leaf curl disease in field conditions. Three entries namely RSFH-1887, DRSH-1 and NDSH-2551 showed less than 10 per cent disease incidence and were categorized as resistant or moderately resistant. According to Vindhyashree (2014), out of 21 sunflower genotypes (9 AHT and 12 IHT entries) were screened for leaf curl virus reaction under natural disease pressure. None of the genotypes found free from infection. However, some entries KSFH-284, RSFH-1887, S-2216, KBSH-71, WBSH-2034, WBSH-2021 and RSFH-600 were recorded less incidence. Similarly, Niharika *et al.* (2025)<sup>[4]</sup> evaluated 48 sunflower genotypes for leaf curl disease resistance during *rabi* 2024-25 at Nandyal. Disease incidence increased progressively from 30 to 75 DAS. NDLA-2 × NDI-51 showed moderate resistance with 8.71 per cent at 75 DAS, whereas KBSH-44 recorded 73.10 per cent. The study concluded that, the identified resistant entries can be utilized in resistance for effective management of sunflower leaf curl disease.

**Table 2:** Reaction of sunflower genotypes against sunflower leaf curl disease under field condition during *rabi*, 2025-26

| Sl. No. | Name of the genotypes | Disease Incidence (%) |           |           | Scale | Reaction               |
|---------|-----------------------|-----------------------|-----------|-----------|-------|------------------------|
|         |                       | At 30 DAS             | At 60 DAS | At 90 DAS |       |                        |
| 1       | RCMS-103B             | 11.11                 | 22.22     | 22.22     | 3     | Moderately susceptible |
| 2       | RCMS-104B             | 0.00                  | 11.11     | 22.22     | 3     | Moderately susceptible |
| 3       | RCMS-105B             | 10.00                 | 10.00     | 20.00     | 3     | Moderately susceptible |
| 4       | RCMS-107B             | 16.66                 | 33.33     | 41.66     | 4     | Susceptible            |
| 5       | CMS-112B              | 0.00                  | 0.00      | 8.65      | 2     | Moderately resistant   |
| 6       | CMS-135B              | 0.00                  | 9.20      | 9.20      | 2     | Moderately resistant   |
| 7       | RCMS-38B              | 0.00                  | 9.09      | 9.09      | 2     | Moderately resistant   |
| 8       | CMS-249B              | 15.38                 | 23.07     | 38.46     | 4     | Susceptible            |
| 9       | CMS-335B              | 14.28                 | 28.57     | 28.57     | 4     | Susceptible            |
| 10      | CMS-1103B             | 0.00                  | 12.50     | 12.50     | 3     | Moderately susceptible |
| 11      | CMS-1B                | 14.28                 | 14.28     | 33.33     | 4     | Susceptible            |
| 12      | CMS-8B                | 10.00                 | 10.00     | 30.00     | 4     | Susceptible            |
| 13      | CMS-9B                | 11.11                 | 22.22     | 44.44     | 4     | Susceptible            |
| 14      | NDCMS-2B              | 0.00                  | 14.24     | 28.87     | 4     | Susceptible            |
| 15      | NDCMS-4B              | 11.11                 | 11.11     | 22.22     | 3     | Moderately susceptible |
| 16      | CMS-17B               | 14.28                 | 42.88     | 42.88     | 4     | Susceptible            |

|    |                 |       |       |       |   |                        |
|----|-----------------|-------|-------|-------|---|------------------------|
| 17 | CMS-34B         | 30.00 | 40.00 | 50.00 | 4 | Susceptible            |
| 18 | CMS-76B         | 0.00  | 9.09  | 18.18 | 3 | Moderately susceptible |
| 19 | RCMS-96B        | 12.50 | 25.00 | 37.50 | 4 | Susceptible            |
| 20 | RCMS-98B        | 14.28 | 28.57 | 33.33 | 4 | Susceptible            |
| 21 | RCMS-225B       | 0.00  | 10.00 | 20.00 | 3 | Moderately susceptible |
| 22 | R-127-1         | 21.40 | 47.14 | 52.42 | 5 | Highly susceptible     |
| 23 | RSFH-700        | 0.00  | 9.00  | 9.00  | 2 | Moderately resistant   |
| 24 | RSFH-719        | 6.25  | 12.50 | 18.71 | 3 | Moderately susceptible |
| 25 | RSFH-124        | 8.33  | 16.66 | 25.00 | 3 | Moderately susceptible |
| 26 | RSFH-33         | 8.33  | 16.66 | 33.33 | 4 | Susceptible            |
| 27 | KBSH-44 (Check) | 21.42 | 28.57 | 40.28 | 4 | Susceptible            |

**Table 3:** Categorization of sunflower hybrids against sunflower leaf curl virus disease during *rabi*, 2025-26

| SL No. | Disease scale (0-5 scale) | Disease grade (% incidence)           | Genotypes                                                                                                         | No. of genotypes |
|--------|---------------------------|---------------------------------------|-------------------------------------------------------------------------------------------------------------------|------------------|
| 1      | 0                         | Highly resistant (0 to 1 %)           | -                                                                                                                 | -                |
| 2      | 1                         | Resistant (1.1 to 5 %)                | -                                                                                                                 | -                |
| 3      | 2                         | Moderately resistant (5.1 to 10 %)    | CMS-112B, CMS-135B, RCMS-38B and RSFH-700                                                                         | 4                |
| 4      | 3                         | Moderately susceptible (10.1 to 25 %) | RCMS-103B, RCMS-104B, RCMS-105B, CMS-1103B, NDCMS-4B, CMS-76B, RCMS-225B, RSFH-719 and RSFH-124                   | 9                |
| 5      | 4                         | Susceptible (25.1 to 50 %)            | RCMS-107B, CMS-249B, CMS-335B, CMS-1B, CMS-8B, CMS-9B, NDCMS-2B, CMS-17B, CMS-34B, RCMS-96B, RCMS-98B and RSFH-33 | 12               |
| 6      | 5                         | Highly susceptible (50.1 and above)   | R-127-1                                                                                                           | 1                |

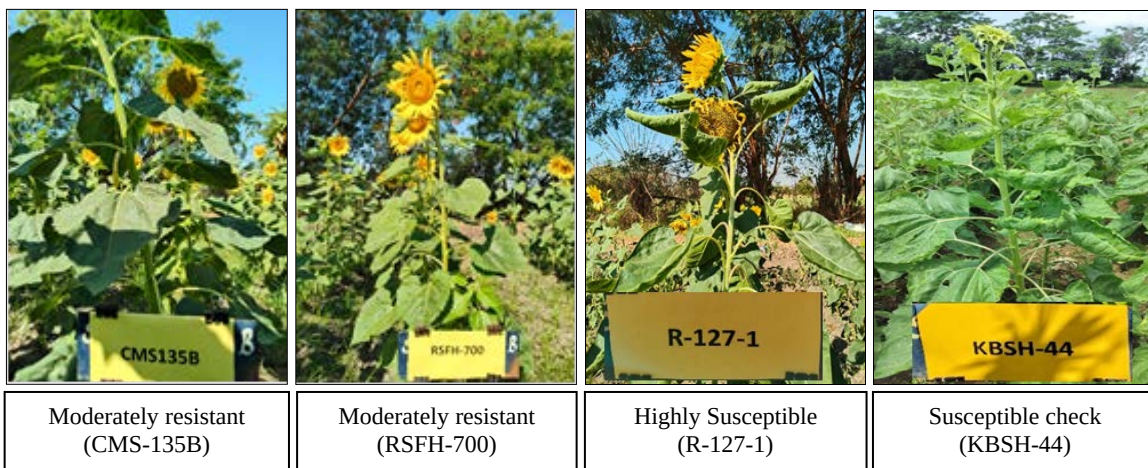


**Plate 1:** Screening of sunflower genotypes against sunflower leaf curl disease during *rabi* 2025-26 at MARS, Raichur

## Conclusion

None of the screened sunflower genotypes screened exhibited highly resistance or resistant reaction to sunflower leaf curl disease, indicating the absence of strong resistance sources. However, four genotypes viz., CMS-112B, CMS-135B, RCMS-38B, RSFH-700 showed moderately resistant reactions.

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## References

1. Anonymous, United States Department of Agriculture (USAD). World Agricultural Production, 2025, 37.
2. Deepa. Investigations on leaf curl disease of sunflower (*Helianthus annuus* L.) caused by begomovirus. M.Sc. (Agri.) Thesis, Univ. Agric. Sci., Raichur, Karnataka, India, 2013, p110.
3. Maruthi MN, Czosnek H, Vidavski F, Tarba SY, Milo J, Leviatov S, et al. Comparison of resistance to tomato leaf curl virus India and tomato yellow leaf curl virus (Israel) among *Lycopersicon* wild species, breeding lines and hybrids. Eur. J. Plant Pathol.,2003:109:1-11.
4. Niharika PB, Ravi Prakash Reddy V, Santosh Kumar Naik B, Venkataramanamma K, Reddy SM. Field screening for leaf curl disease resistance in sunflower (*Helianthus annuus* L.) genotypes. J. Exp. Agric. Intl.,2025:47(6):2457-0591.
5. Saharan GS, Mehta N, Sangwan MS. Diseases of Oilseed Crops. Indus Publishing Co., New Delhi, 2005, 643.
6. Venkataramanamma K, Reddy BVRP, Prabhakar K, Ramadevi S, Naseeruddin R, Raghavendra T. Screening, morphological and biochemical basis of resistance against leaf curl disease in sunflower coordinated entries. J. Adv. Biol. Biotechnol.,2026:29(5):822-829.