

Survey for the incidence of necrosis virus disease and thrips in sunflower growing areas of southern Karnataka

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ABSTRACT

The sunflower necrosis virus disease was prevalent in all the sunflower fields visited during survey with the maximum necrosis disease incidence of 24 per cent and highest thrips numbers 3.4 per five plants during March 2005. The highest incidence of necrosis of 22 per cent and high mean thrips numbers 2.42 per five plants was observed on KBSH-1 in Bagepalli taluk in the May 2006 sown crop. However, least incidence of necrosis disease was observed in Bangalore (4%), and Shimoga (4%) followed by HD Kote (6%) and Honnali (6%) during September 2006. The survey revealed that the disease and the thrips vectors were least during *rabi* months whereas, it were more in *kharif* sown crops. The weed hosts such as, *Euphorbia geniculata*, *Galinsoga parviflora*, *Phyllanthus niruri* and *Malvestrum coromandelianum* were found to be prevalent in most of the surveyed fields especially during summer months thus these weeds serve as source of inoculum for necrosis disease by harbouring the thrips vectors and the virus. Symptoms of the infected plants showed systemic mosaic, mottling, twisting, puckering and yellowing of leaves and such plants were stunted with reduced internodal length compared to healthy plants.

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Sunflower is one of the important oilseed crops of the world and ranks third, after soybean and groundnut in area and production. In India, it is grown over an area of 20.14 lakh ha with the production of 10.86 million tones and productivity of 539 kg/ha (Anonymous, 2004). Karnataka is one of the leading sunflower growing states in the country with acreage of 11.25 lakh ha and production of 4.22 million tones with a productivity of 375 kg/ha (Anonymous, 2004).

A virus disease on sunflower with necrotic symptoms causing severe yield loss was reported to occur around Bangalore (Anonymous, 1997; Singh *et al.*, 1997). The disease incidence was reported from several parts of Karnataka *viz.*, Dharwad, Raichur, Chitradurga, Haveri, Ranebennur, Naragund, Gadag, Tumkur and Kolar districts (Anonymous, 1998). An unusual necrosis disease on sunflower was observed in serous proportion in parts of Karnataka during the summer in 1997 (Nagaraju *et al.*, 1998).

MATERIALS AND METHODS

The survey was undertaken in experimental plots and in farmer's field in southern Karnataka during different months of 2005 and 2006. In each of the plot surveyed, five rows were randomly selected and the per cent disease incidence was calculated as given below.

$$\text{Per cent disease incidence} = \frac{\text{Number of plants infected}}{\text{Total number of plants}} \times 100$$

Information regarding places visited, genotypes

involved, stage of crop, month of survey, name of the farmer, cropped area, date of sowing and weed hosts found in the surveyed fields were recorded during the course of survey.

RESULTS AND DISCUSSION

The symptoms were observed on sunflower during the survey under field condition. The symptoms on infected sunflower plants initially appeared as chlorotic spots on leaves which suddenly turned necrotic on a part of the leaf lamina between mid rib and leaf margin, making the leaf to twist.

During surveys, the necrosis disease incidence was observed to be highest in Pavagada, Challakere and Gowribidanur taluks. In Pavagada, the disease incidence recorded on sunflower hybrid KBSH-1 was 24 per cent during summer 2005, whereas in Gowribidanur taluk, it was 20 per cent under irrigated condition during April 2005. Similarly, the disease incidence of 20 per cent was recorded in Challakere during March 2006 under irrigated condition (Table 2); while it was minimum with 6 per cent in H D Kote during June 2005 (Table 1). Minimum per cent disease incidence (4.0) was observed on KBSH-1 in Shimoga (Kunchenahalli) under rainfed condition during July 2005, Table 2 while it was maximum of 13.3 per cent in Hiriyur during August 2005 under rainfed condition (Table 1). At GKVK, in seed production plot, the necrosis disease incidence on A-line was 4 per cent, on GKVK-1 it was 16 per cent under rainfed during March 2006 (Table 1)

Table 1: Survey for the incidence of sunflower necrosis virus disease and thrips vector in southern Karnataka during 2005

Sr. No.	Village	Taluk	Area (ac)	No. of plants Observed	Per cent Infected	Thrips mean per 5 plant	Month sown	Stage of crop plant	Condition	Symptoms on sunflower plant	Weed hosts in field	
1.	Neralagunte	Challakere (N. hat)	1.50	30	5	16.66	1.1	10.3.04	Flowering	Irrigation	Marginal chlorosis and necrotic leaves	<i>Malvestrum coronandelianum</i>
2.	Madkeri pura	Chitradurga	1.00	30	4	13.33	1.16	10.11.04	Flowering	Rainfed	Marginal chlorosis of leaves	<i>Gainsoga parviflora</i>
3.	Buriginarappa	Heriya	2.50	30	4	13.33	0.9	4.6.04	Head formation	Rainfed	Chlorosis and reduction of leaves size	<i>Gainsoga parviflora</i>
4.	Jayanti nagar	Channagari	1.35	30	3	10.00	0.9	1.7.04	Head formation	Rainfed	Motling of leaves	<i>Parthenium hysterophorus</i>
5.	Sakarayapatna	Kodur	0.5	30	3	10.00	0.6	20.10.04	Flowering	Irrigation	Chlorosis	<i>Phyllanthus niruri</i>
6.	Naga lamadike	Pavagada	1.50	50	12	24.00	3.4	7.3.04	Flowering	Irrigation	Chlorosis of leaves.	<i>Parthenium hysterophorus</i>
7.	Lakshmi Sagar	Sira	1.0	30	5	16.66	2.06	16.4.04	Grain filling	Irrigation	Necrotic spots and curling of leaves	<i>Parthenium hysterophorus</i>
8.	Heriya	Yalander (Channanagar)	0.50	30	2	6.66	0.8	12.5.04	Flowering	Rainfed	Marginal chlorosis and necrotic patch	<i>Euphorbia geniculata</i>
9.	Terakumbi	Gundlpet	1.50	50	5	10.00	1.0	20.8.04	Head formation	Rainfed	Marginal chlorosis and necrotic patch	<i>Euphorbia geniculata</i>
10.	AICRP, GKVK	Bangalore	3.0	50	7	14.00	2.02	14.5.04	Grain filling	Irrigation	Stunted growth of plant	<i>Parthenium hysterophorus</i>
11.	GKVK research plot	Bangalore	1.0	50	8	16.00	2.45	10.11.04	Flowering	Irrigation	Stunted growth of plant	<i>Phyllanthus niruri</i>

Table 2: Survey for the incidence of sunflower necrosis virus disease and thrips vector in southern Karnataka during 2005

Sr. No.	Village	Taluk	Area (ac)	No. of plants Observed	Per cent Infected	Thrips mean per 5 plant	Month sown	Stage of crop plant	condition	Symptoms on sunflower plant	Weed hosts in field	
1.	Krishna nagar	Challakere	1.0	30	6	20.00	2.70	4.1.05	Vegetative	Irrigation	Chlorosis of leaves	<i>Parthenium hysterophorus</i>
2.	Bijikere	Molkaluru	0.5	30	4	13.30	1.365	14.01.05	Grain filling state	Irrigation	Mosaic and mottle symptoms on leaves	<i>Parthenium and Euphorbia</i>
3.	Maladihalli	Hoalkere	0.50	30	4	13.33	1.26	15.1.05	Vegetative	Irrigation	Chlorosis of leaves	<i>Gainsoga parviflora</i>
4.	Aluratti	Davanagere	2.5	30	3	10.00	1.22	10.7.05	Vegetative	Rainfed	Necrotic patches on leaves	<i>Euphorbia geniculata</i>
5.	Waldasahalli	Gowribidunoor	1.5	50	10	20.00	2.24	14.3.05	Flowering	Irrigation	Chlorosis with necrotic spot	<i>Malvestrum coronandelianum</i>
6.	Hongeratahalli	Bagepalli	1.0	50	11	22.00	2.42	17.3.05	Flowering	Irrigation	Chlorosis with necrotic spots	<i>Malvestrum coronandelianum</i>
7.	Kagathi	Chintamani	1.0	30	5	16.50	1.6	13.4.05	Vegetative	Irrigation	Mosaic with mottling of leaves	<i>Gainsoga parviflora</i>
8.	Elavala	Mysore	1.25	50	7	14.00	1.02	3.2.05	Flowering	Irrigation	Chlorosis leaves	<i>Parthenium hysterophorus</i>
9.	Hudboor	HD Koe	1.5	50	3	6.00	0.54	30.12.05	Flowering	Irrigation	Stunted growth of plant	<i>Malvestrum coronandelianum</i>
10.	Kooganahalli	Honnali	1.0	50	3	6.00	0.68	10.4.05	Vegetative	Irrigation	Stunted growth	<i>Parthenium hysterophorus</i>
11.	Kunchanahalli	Shimoga	2.0	50	2	4.00	0.60	14.5.05	Vegetative	Rainfed	Chlorosis of leaves	<i>Achyranthus aspera</i>
12.	Gokare	Devanhalli	1.0	50	5	10.00	1.74	11.3.05	Flowering	Irrigation	Mosaic with mottling of leaves	<i>Malvestrum coronandelianum</i>
13.	Kodagurki	Devanhalli	0.5	30	4	13.33	1.06	13.3.05	Head formation	Irrigation	Reduction in leaf size	<i>Parthenium hysterophorus</i>
14.	Sulbele	Hoskote	1.0	60	6	10.00	1.66	6.2.05	Flowering	Irrigation	Stunted growth of plant	<i>Gainsoga parviflora</i>
15.	Bashethalli	Doddaballapura	1.0	50	7	14.00	2.84	11.4.05	Grain filling	Irrigation	Chlorosis of leaves	<i>Parthenium hysterophorus</i>
16.	Challakere	Challakere	2.0	60	10	16.66	3.40	10.6.05	Flowering	Irrigation	Marginal chlorosis and necrosis of leaves	<i>Malvestrum coronandelianum and Euphorbia geniculata</i>
17.	Bargalore	Bargalore	0.5	50	8	16.00	3.46	21.1.05	Flowering	Rainfed	Chlorosis and necrosis of leaves	<i>Parthenium hysterophorus</i>
18.	Bargalore	Bargalore	1.0	50	2	4.00	3.0	20.1.05	Flowering	Rainfed	Curling of leaves	<i>Euphorbia geniculata</i>

During the survey, on number of thrips population in southern Karnataka, the maximum mean number of thrips population of 3.40 was recorded on KBSH-1 in farmers field at Pavagada during February 2005, while at GKVK, highest number of mean thrips of 3.46 was found on GKVK-1 lines under irrigated condition during February 2006 and minimum number of thrips population of 0.54 per plant was recorded on KBSH-1 in HD Kote taluk during December 2006. Similarly, minimum number of thrips (0.60) was found on KBSH-1 hybrid in Kadur taluk during December 2005 (Table 1).

The surveyed sunflower field recorded with various weed hosts viz., *Parthenium hysterophorus*, *Galinsoga parviflora*, *Malvestrum coromandelianum*, *Euphorbia geniculata* and *Phyllanthus niruri* (Table 1 and 2). In most of the cases, under field condition *Parthenium*, *Euphorbia*, *Galinsoga* and *Malvestrum* were prevalent.

The results obtained on the survey for the prevalence of the sunflower necrosis virus indicated that the disease was prevalent in all the sunflower fields visited both in seed production plots and in farmer's fields during 2005 and 2006. Further, the disease and its thrips vector were found to occur in all the seasons at varying levels in southern Karnataka.

The survey revealed that maximum necrosis disease incidence of 24 per cent and highest thrips numbers 3.4 per five plants were recorded in pavagada taluk during March 2005 (Table 1). The highest incidence of necrosis of 22 per cent and high mean thrips numbers 2.42 per five plants was observed on KBSH-1 in Bagepalli taluk in May 2006 sown crop (Table 2). However, least incidence of necrosis disease was observed in Bangalore (4%), followed by Shimoga (4%), HD Kote (6%) and Honnali (6%) during September 2006 (Table 2). The survey also revealed that the disease and the thrips vectors were least during *rabi* months whereas, it was more in *kharif* sown crops. Nagaraju *et al.* (1998) have reported that there was high incidence of the disease (35%) during summer months. Anil Kumar (1999) reported the maximum incidence upto 21 per cent during summer and Shrivasharanayya (2000) recorded maximum disease incidence of 21.1 per cent during summer. Further, they also reported that the incidence of disease decreased after the onset of rains during *kharif* and decreased further in *rabi* months, which is similar to the results obtained in the present investigations.

The weed hosts such as, *Euphorbia geniculata*, *Galinsoga parviflora*, *Phyllanthus niruri* and *Malvestrum coromandelianum* were found to be prevalent in most of the surveyed fields especially during summer months and thus these weeds serve as source of

inoculum for necrosis disease by harbouring the thrips vectors and the virus disease.

Symptomatological observations under field conditions revealed that the disease appeared as chlorosis of young leaves and necrosis of part of leaf lamina, the necrosis extended as black streak through the petiole and to the terminal shoots. In some cases, systemic symptoms developed after initial necrosis as various types of mosaic mottling, puckering, twisting of leaves, narrowing, yellowing and stunted growth due to reduced internodal length. Further, the infection could be seen at all the stages of the crop growth. The symptoms observed were similar to that reported on this crop by earlier workers (Anonymous, 1997, 1998, 2000; Nagaraju *et al.*, 1998; Anil Kumar, 1999; Shivasharanayya, 2000 and Anjula, 2000).

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