



SUMMARY

Various crop plants tested by mechanical sap and thrips inoculation, the virus infected *Helianthus annuus* (cv. KBSH-44), *Citrullus lanatus* (cv. Arka Manik), *Cucurbita moschata* (cv. Arka Suryamukhi), *Arachis hypogaea* (cv. JL-24), *Lablab purpureus* (cv. HA-3), *Macrotyloma uniflorum* (cv. PHG-9), *Vigna unguiculata* (cv. C-152), *Nicotiana tabacum* (cv. Xanthi) and *Glycine max* (cv. KB-79). The highest mean per cent transmission was recorded on *Helianthus annuus* (cv. KBSH-44) both by sap inoculation and thrips transmission (53.33 and 26.67, respectively). Among thirty six weed plants tested, twenty four weeds viz., *Lagascea mollis*, *Alternanthera sessilis*, *Commelina benghalensis*, *Crotalaria spectabilis*, *Euphorbia hirta*, *Cassia obtusifolius*, *Ocimum sanctum*, *Sida rhombifolia*, *Oxalis corniculata*, *Physalis minima*, *Galinsoga parviflora*, *Euphorbia geniculata*, *Solanum nigrum*, *Phyllanthus niruri*, *Malvestrum coromandelianum*, *Ageratum conyzoides*, *Achyranthus aspera*, *Abutilon indicum*, *Ocimum canum*, *Crotalaria striata*, *Bidens pilosa*, *Stachytarpetta indica*, *Acanthospermum hispidum* and *Xanthium strumarium* were able to show symptoms through sap and thrips inoculation. Highest mean per cent transmission however was observed in case of *Achyranthes aspera* (48.00) through sap and in *Galinsoga parviflora* (25.00) through thrips.

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A serious virus disease on sunflower with necrotic symptoms causing severe yield loss was reported to occur around Bangalore (Anonymous, 1997; Singh *et al.*, 1997). Because of its fast spreading nature, this necrosis virus was considered as one of the deadly virus diseases on this crop in India (Nagaraju *et al.*, 1998). Necrosis virus can cause infection at any stage of the plant growth causing necrosis of a part of the leaf lamina and making the leaf to twist, followed by varied type of necrosis and mosaic symptoms (Nagaraju and Hanumantha Rao, 1999). Ajith Prasad and Nagaraju (2005) investigated and determined the disease transmission through sap and *Thrips palmi* (Karny). Host-range studies carried out by Ramaiah *et al.* (2001) revealed that an isometric virus causing sunflower necrosis disease could infect members of plants belonging to families Amaranthaceae, Chenopodiaceae and Fabaceae. Present study was conducted in order to know the various plants and weed

species to which the virus can infect.

MATERIALS AND METHODS

An attempt was made to study the transmission of sunflower necrosis virus to thirty nine different crop plants and thirty seven different weeds found in and around sunflower fields at Zonal Agricultural Research Station, GKVK, UAS, Bangalore belonging to different families viz., Asteraceae, Brassicaceae, Cucurbitaceae, Caricaceae, Euphorbiaceae, Fabaceae, Malvaceae, Pedaliaceae, Solanaceae, Convolvulaceae, Amranthaceae, Labiateae, Commelinaceae, Portulacaceae and Oxalidaceae, by mechanical sap and thrips inoculations.

Transmission of SNV by mechanical sap inoculation:

A set of thirty nine crop plants and thirty seven weed plants (three replications each) were sap inoculated at glasshouse conditions. Young tender leaves showing typical symptoms

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of sunflower necrosis disease were collected from naturally infected sunflower plants from the fields in and around the campus. These leaves were used to prepare standard inoculum using the 0.05M phosphate buffer. The mechanically inoculated plants were labeled and kept for symptom expression in glasshouse and observed upto 40 days.

Transmission of SNV through *Thrips palmi*:

About 20-30 nymphs were released on young sunflower leaves showing clear disease symptoms. The nymphs were allowed for acquisition access period (AAP) of three days under normal room temperature. Nymphs fed on healthy leaves served as check. After three days, 20-25 nymphs were transferred on to the test crop and weed plants belonging to different families raised in insect proof wooden cages. Three replications of the same were maintained. The plants were kept undisturbed allowing the nymphs to feed. These test plants were kept under observation upto 50 days for symptom expression.

RESULTS AND DISCUSSION

Sunflower necrosis virus infected the crop plants viz., *Helianthus annuus* (cv. KBSH-44), *Citrullus lanatus* (cv. Arka Manik), *Cucurbita moschata* (cv. Arka Suryamukhi), *Arachis hypogaea* (cv. JL-24), *Lablab purpureus* (cv. HA-3), *Macrotyloma uniflorum* (cv. PHG-9), *Vigna unguiculata* (cv. C-152), *Nicotiana tabacum* (cv. Xanthi) and *Glycine max* (cv. KB-79) on mechanical sap and thrips inoculation. Similar results were obtained by Halakeri (1999) who reported *Vigna unguiculata* (cv. C-152), Anil Kumar (1999) reported *Cucumis sativus* (cv. GREEN LONG) as the hosts of SNV (Table 1).

Mean per cent transmission of SNV through sap ranged from 15.00 to 53.33. Incase of *Helianthus annuus* (KBSH-44) highest mean per cent transmission of 53.33 was observed.

Mean per cent transmission of SNV through *Thrips palmi* Karny ranged from 6.67 to 26.67. Highest mean per cent transmission of 26.67 was also observed incase of *Helianthus annuus* (cv. KBSH-44), *Arachis hypogaea* (cv. JL-24) and *Citrullus lanatus* (cv. Arka Manik). However, *Glycine max* (cv. KB-79) did not produce any symptoms due to thrips transmission.

The symptoms produced were chlorotic patches on leaves, followed by necrotic lesions, downward twisting of leaves, vein thickening and stunted growth incase of *Helianthus annuus* (cv. KBSH-44). In *Arachis hypogaea* (cv. JL-24), the virus produced symptoms as

mild mosaic with chlorotic patches, vein thickening, necrosis on the tip of the leaf and also at the growing bud. Further, reduction in leaf size and stunted growth was observed. Incase of *Macrotyloma uniflorum* (cv. PHG-9), mild mosaic and necrosis, vein thickening, severe puckering reduction in the leaf size was observed. In *Citrullus lanatus* (cv. ARKA MANIK) mild mosaic to chlorotic patches, necrosis of leaves and growing bud were recorded. On crops viz., *Lablab purpureus* (cv. HA-3), *Vigna unguiculata* (cv. C-152) and *Glycine max* (cv. KB-79) mosaic symptom was recorded. Whereas incase of *Cucurbita moschata* (cv. ARKA SURYAMUKHI) chlorotic patches with necrotic lesions on half of the leaves was recorded. However, incase of *Nicotiana tabacum* (cv. XANTHI) mosaic mottling were observed. Similar observations on symptoms were made by Anil Kumar (1999) and Halakeri (1999).

Among thirty six weed plants tested twenty four weeds viz., *Lagascea mollis*, *Alternanthera sessilis*, *Commelina benghalensis*, *Crotalaria spectabilis*, *Euphorbia hirta*, *Cassia obtusifolius*, *Ocimum sanctum*, *Sida rhombifolia*, *Oxalis corniculata*, *Physalis minima*, *Galinsoga parviflora*, *Euphorbia geniculata*, *Solanum nigrum*, *Phyllanthus niruri*, *Malvestrum coromandelianum*, *Ageratum conyzoides*, *Achyranthus aspera*, *Abutilon indicum*, *Ocimum canum*, *Crotalaria striata*, *Bidens pilosa*, *Stachytarpetta indica*, *Acanthospermum hispidum* and *Xanthium strumarium* were able to show symptoms on SNV inoculation through sap and through thrips. The symptoms were observed at 20-25 days after inoculation. These findings are similar to the results obtained by Lokesh (2005), who reported *Galinsoga parviflora*, *Euphorbia geniculata*, *Phyllanthus niruri*, *Malvestrum coromandelianum*, *Achyranthus aspera*, *Abutilon indicum*, *Ocimum canum*, *Crotalaria striata*, *Bidens pilosa*, *Acanthospermum hispidum*, *Guizotia abyssinica* and *Ageratum conyzoides* as weed hosts for SNV.

On *Alternanthera sessilis*, *Commelina benghalensis*, *Sida rhombifolia* *Oxalis corniculata*, *Euphorbia hirta*, *Lagascea mollis*, *Solanum nigrum*, *Phyllanthus niruri*, *Ocimum canum*, *Xanthium strumarium* and *Bidens pilosa* mosaic and mosaic mottling was observed.

Chlorotic patches were observed on *Cassia obtusifolius*, *Ocimum sanctum*, *Physalis minima*, *Galinsoga parviflora*, *Euphorbia geniculata*, *Ageratum conyzoides*, *Abutilon indicum* and *Crotalaria striata*. Where as chlorosis followed by vein clearing and by

Table 1: Transmission of SNV to crop plants through mechanical sap inoculation

Sr. No.	Crop species		Variety	Family	Mean transmission (%)	Symptoms
	Scientific name	Common name				
1.	<i>Helianthus annuus</i>	Sunflower	KBSH-44	Asteraceae	53.33	CP, NL, DTL, VT, SG
2.	<i>Carthamus tinctorius</i>	Safflower	C-18	Asteraceae	---	---
3.	<i>Guizotia abyssinica</i>	Niger	S-26	Asteraceae	---	---
4.	<i>Tagetes erecta</i>	Marigold	Chinthamani	Asteraceae	---	---
5.	<i>Zinnia elegans</i>	Zinnia	ZE-231	Asteraceae	---	---
6.	<i>Brassica nigra</i>	Mustard	Kanakpura local	Brassicaceae	---	---
7.	<i>Brassica oleracea</i> var. <i>gongylodes</i>	Knol khol	KO-O4-890	Brassicaceae	---	---
8.	<i>Brassica oleracea</i> var. <i>capitata</i>	Cabbage	B0-01-001	Brassicaceae	---	---
9.	<i>Raphanus sativus</i>	Radish	Mino Long	Brassicaceae	---	---
10.	<i>Cucumis sativus</i>	Cucumber	PS -24	Cucurbitaceae	---	---
11.	<i>Citrullus lanatus</i>	Watermelon	Arka Manik	Cucurbitaceae	48.33	M, CP, NGT
12.	<i>Cucumis melo</i>	Musk melon	Deepti	Cucurbitaceae	---	---
13.	<i>Cucurbita moschata</i>	Pumpkin	Arka suryamukhi	Cucurbitaceae	25.00	CP, NL
14.	<i>Lagenaria siceraria</i>	Bottle gourd	PSPR	Cucurbitaceae	---	---
15.	<i>Luffa acutangula</i>	Ridge gourd	Arka sujata	Cucurbitaceae	---	---
16.	<i>Momordica charantia</i>	Bitter gourd	Arka Harit	Cucurbitaceae	---	---
17.	<i>Trichosanthes cucumerina</i>	Snake gourd	C0-2	Cucurbitaceae	---	---
18.	<i>Ricinus communis</i>	Castor	DCS-9	Euphorbiaceae	---	---
19.	<i>Arachis hypogaea</i>	Groundnut	JL-24	Fabaceae	50.00	CP, NL, NGT
20.	<i>Glycine max</i>	Soybean	KB-79	Fabaceae	21.67	M
21.	<i>Cajanus cajan</i>	Pigeonpea	TTB-7	Fabaceae	---	---
22.	<i>Pisum sativum</i>	Pea	KPMR-1	Fabaceae	---	---
23.	<i>Vigna radiate</i>	Green gram	Pusa Baisaki	Fabaceae	---	---
24.	<i>Vigna mungo</i>	Black gram	T-9	Fabaceae	---	---
25.	<i>Lablab purpureus</i>	Field bean	HA-3	Fabaceae	26.67	M
26.	<i>Macrotyloma uniflorum</i>	Horse gram	PHG-9	Fabaceae	48.33	MM, MN, VT, RL, SP
27.	<i>Phaseolus vulgaris</i>	Common bean	Topcrop	Fabaceae	---	---
28.	<i>Crotalaria juncea</i>	Sunhemp	Local	Fabaceae	---	---
29.	<i>Cicer arietinum</i>	Chickpea	A-1	Fabaceae	---	---
30.	<i>Vigna unguiculata</i>	Cowpea	C-152	Fabaceae	26.67	M
31.	<i>Cyamopsis tetragonoloba</i>	Cluster bean	Pusa Navadhar	Fabaceae	---	---
32.	<i>Abelmoschus esculentus</i>	Bhendi	Arke Komar	Malvaceae	---	---
33.	<i>Sesamum indicum</i>	Sesamum	KL-31	Pedaliaceae	---	---
34.	<i>Capsicum annum</i>	Capsicum	Pusa Jwala	Solanaceae	---	---
35.	<i>Praecitrullus fistulosus</i>	Round melon	Arka Tinda	Solanaceae	---	---
36.	<i>Lycopersicon esculentum</i>	Tomato	Pusa Ruby	Solanaceae	---	---
37.	<i>Nicotiana tabacum</i>	Tobacco	Xanthi	Solanaceae	45.00	MML
38.	<i>Gossypium hirsutum</i>	Cotton	Varalakshmi	Malvaceae	---	---
39.	<i>Solanum melongena</i>	Brinjal	BB-12	Solanaceae	---	---

CP = Chlorotic patches, DTL = Downward twisting of leaf, M = Mosaic, MM = Mild mosaic, MML = Mosaic mottling
 MN = Mild necrosis, NGT = Necrosis on growing bud, NL = Necrotic lesion, RL = Reduction in leaf size, SP= Severe puckering
 SG = Stunted growth, VT = Vein thickening

Table 2: Transmission of SNV to crop plants through *Thrips palmi*

Sr. No.	Crop species		Variety	Family	Mean transmission (%)	Symptoms
	Scientific name	Common name				
1.	<i>Helianthus annuus</i>	Sunflower	KBSH-44	Asteraceae	26.67	CP, NL, DTL, VT, SG
2.	<i>Carthamus tinctorius</i>	Safflower	C-18	Asteraceae	---	---
3.	<i>Guizotia abyssinica</i>	Niger	S-26	Asteraceae	---	---
4.	<i>Tagetes erecta</i>	Marigold	Chinthamani	Asteraceae	---	---
5.	<i>Zinnia elegans</i>	Zinnia	ZE-231	Asteraceae	---	---
6.	<i>Brassica nigra</i>	Mustard	Kanakpura local	Brassicaceae	---	---
7.	<i>Brassica oleracea</i> var. <i>gongylodes</i>	Knol khol	KO-O4-890	Brassicaceae	---	---
8.	<i>Brassica oleracea</i> var. <i>Capitata</i>	Cabbage	B0-01-001	Brassicaceae	---	---
9.	<i>Raphanus sativus</i>	Radish	Mino Long	Brassicaceae	---	---
10.	<i>Cucumis sativus</i>	Cucumber	PS -24	Cucurbitaceae	15.00	M, CP
11.	<i>Citrullus lanatus</i>	Watermelon	Arka Manik	Cucurbitaceae	26.67	M, CP, NGT
12.	<i>Cucumis melo</i>	Muskmelon	Deepti	Cucurbitaceae	---	---
13.	<i>Cucurbita moschata</i>	Pumpkin	Arka suryamukhi	Cucurbitaceae	13.33	CP, NL
14.	<i>Lagenaria siceraria</i>	Bottle gourd	PSPR	Cucurbitaceae	---	---
15.	<i>Luffa acutangula</i>	Ridge gourd	Arka sujata	Cucurbitaceae	12.00	M, CP
16.	<i>Momordica charantia</i>	Bitter gourd	Arka Harit	Cucurbitaceae	---	---
17.	<i>Trichosanthes cucurbitaria</i>	Snake gourd	C0-2	Caricaceae	---	---
18.	<i>Ricinus communis</i>	Castor	DCS-9	Euphorbiaceae	---	---
19.	<i>Arachis hypogaea</i>	Groundnut	JL-24	Fabaceae	26.67	CP, NL, NGT
20.	<i>Glycine max</i>	Soybean	KB-79	Fabaceae	---	---
21.	<i>Cajanus cajan</i>	Pigeonpea	TTB-7	Fabaceae	---	---
22.	<i>Pisum sativum</i>	Pea	KPMR-1	Fabaceae	---	---
23.	<i>Vigna radiata</i>	Green gram	Pusa Baisaki	Fabaceae	---	---
24.	<i>Vigna mungo</i>	Black gram	T-9	Fabaceae	---	---
25.	<i>Lablab purpureus</i>	Field bean	HA-3	Fabaceae	06.67	M
26.	<i>Macrotyloma uniflorum</i>	Horse gram	PHG-9	Fabaceae	23.33	MM, MN, VT, SP, RL
27.	<i>Phaseolus vulgaris</i>	Common bean	Topcrop	Fabaceae	---	---
28.	<i>Crotalaria juncea</i>	Sunhemp	Local	Fabaceae	---	---
29.	<i>Cicer arietinum</i>	Chickpea	A-1	Fabaceae	---	---
30.	<i>Vigna unguiculata</i>	Cowpea	C-152	Fabaceae	16.67	M
31.	<i>Cyamopsis tetragonoloba</i>	Cluster bean	Pusa Navadhar	Fabaceae	---	---
32.	<i>Abelmoschus esculentus</i>	Bhendi	Arke Komar	Malvaceae	---	---
33.	<i>Sesamum indicum</i>	Sesamum	KL-31	Pedaliaceae	---	---
34.	<i>Capsicum annum</i>	Capsicum	Pusa Jwala	Solanaceae	---	---
35.	<i>Praecitrullus fistulosus</i>	Round melon	Arka Tinda	Solanaceae	---	---
36.	<i>Lycopersicon esculentum</i>	Tomato	Pusa Ruby	Solanaceae	---	---
37.	<i>Nicotiana tabacum</i>	Tobacco	Turkish	Solanaceae	10.00	MML
38.	<i>Gossypium hirsutum</i>	Cotton	Varalakshmi	Malvaceae	---	---
39.	<i>Solanum melongena</i>	Brinjal	BB-12	Solanaceae	---	---

CP = Chlorotic patches, DTL = Downward twisting of leaf, M = Mosaic, MM = Mild mosaic, MML = Mosaic mottling
 MN = Mild necrosis, NGT = Necrosis on growing bud, NL = Necrotic lesion, RL = Reduction in leaf size, SP = Severe puckering
 SG = Stunted growth, VT = Vein thickening

Table 3: Transmission of SNV to weed species through sap inoculation

Sr. No.	Weed species		Family	Mean transmission (%)	Symptoms
	Scientific name	Common name			
1.	<i>Lagascea mollis</i>	Sickle leaf	Asteraceae	21.00	MM
2.	<i>Parthenium hysterophorus</i>	Congress grass	Asteraceae	---	---
3.	<i>Sonchus oleraceus</i>	Annual sowthistle	Asteraceae	---	---
4.	<i>Alternanthera sessilis</i>	Sessile joyweed	Amaranthaceae	20.00	M
5.	<i>Amaranthus spinosus</i>	Spiny amaranth	Amaranthaceae	---	---
6.	<i>Commelina benghalensis</i>	Benghal dayflower	Commelinaceae	16.00	M
7.	<i>Ipomoea pandurata</i>	Bigroot morning glory	Convolvulaceae	---	---
8.	<i>Crotalaria spectabilis</i>	Showy crotalaria	Euphorbiaceae	20.00	M
9.	<i>Euphorbia hirta</i>	Asthama weed	Euphorbiaceae	18.00	M, MML
10.	<i>Cassia obtusifolius</i>	Sickle pod	Fabaceae	20.00	CL
11.	<i>Ocimum sanctum</i>	Holi basil	Labiatae	20.00	CL
12.	<i>Sida rhombifolia</i>	Arrowleaf sida	Malvaceae	16.00	M
13.	<i>Oxalis corniculata</i>	Creeping wood sorrel	Oxalidaceae	15.00	M
14.	<i>Portulaca oleraceae</i>	Common purslane	Portulacaceae	---	---
15.	<i>Physalis minima</i>	Wild capegooseberry	Solanaceae	20.00	CL
16.	<i>Galinsoga parviflora</i>	Quick weed	Asteraceae	42.00	CL
17.	<i>Eupatorium odoratum</i>	Siam weed	Asteraceae	---	---
18.	<i>Euphorbia geniculata</i>	Mexican fireplant	Euphorbiaceae	45.00	CL
19.	<i>Solanum nigrum</i>	Black night shade	Solanaceae	25.00	MM
20.	<i>Phyllanthus niruri</i>	Seed under the leaf	Euphorbiaceae	30.00	MM
21.	<i>Malvestrum coromandelianum</i>	False mallow	Malvaceae	45.00	CL, VC
22.	<i>Ageratum conyzoides</i>	Goat weed	Asteraceae	45.00	CL
23.	<i>Polygonum plebjum</i>	Spring weed	Polygonaceae	---	---
24.	<i>Datura stramonium</i>	Jimson weed	Solanaceae	---	---
25.	<i>Tridax procumbense</i>	Tridax daisy	Asteraceae	---	---
26.	<i>Achyranthes aspera</i>	Prickly achyranthes	Amaranthaceae	48.00	M, CL, RL
27.	<i>Abutilon indicum</i>	Monkey bush	Malvaceae	25.00	CL
28.	<i>Ocimum canum</i>	Hairy basil	Labiatae	20.00	MM
29.	<i>Argemone mexicana</i>	Mexican poppy	Papaveraceae	---	---
30.	<i>Crotalaria striata</i>	Smooth crotalaria	Fabaceae	30.00	CL
31.	<i>Bidens pilosa</i>	Spanish needle	Asteraceae	15.00	MM
32.	<i>Borreria stricta</i>	Broad button weed	Rubiaceae	---	---
33.	<i>Stachytarpetta indica</i>	Nettleleaf vervain	Verbenaceae	18.00	CL, NL
34.	<i>Leucas aspera</i>	Dead white nettle	Labiatae	---	---
35.	<i>Acanthospermum hispidum</i>	Hispid starrburr	Asteraceae	20.00	MNL
36.	<i>Synedrella nodiflora</i>	Nodeweed	Asteraceae	---	---
37.	<i>Xanthium strumarium</i>	Cocklebur	Asteraceae	30.00	M

CL – Chlorosis of leaf, M – Mosaic, MM – Mild mosaic, MML – Mosaic mottling, MNL – Marginal necrosis of leaves
 NL – Necrosis of leaf, RL – Reduction in leaf size, VC – Vein clearing

Table 4 : Transmission of SNV to weed species through *Thrips palmi*

Sr. No.	Weed species		Family	Mean transmission (%)	Symptoms
	Scientific name	Common name			
1.	<i>Lagascea mollis</i>	Sickle leaf	Asteraceae	18.00	MM
2.	<i>Parthenium hysterophorus</i>	Congress grass	Asteraceae	---	---
3.	<i>Sonchus oleraceus</i>	Annual sowthistle	Asteraceae	---	---
4.	<i>Alternanthera sessilis</i>	Sessile joyweed	Amaranthaceae	15.00	M
5.	<i>Amaranthus spinosus</i>	Spiny amaranth	Amaranthaceae	---	---
6.	<i>Commelina benghalensis</i>	Benghal dayflower	Commelinaceae	12.00	M
7.	<i>Ipomoea pandurata</i>	Bigroot morning glory	Convolvulaceae	---	---
8.	<i>Crotalaria spectabilis</i>	Showy crotalaria	Fabaceae	10.00	M
9.	<i>Euphorbia hirta</i>	Asthama weed	Euphorbiaceae	13.00	M, MML
10.	<i>Cassia obtusifolius</i>	Sickle pod	Fabaceae	15.00	CL
11.	<i>Ocimum sanctum</i>	Holi basil	Labiatae	18.00	CL
12.	<i>Sida rhombifolia</i>	Arrowleaf sida	Malvaceae	10.00	M
13.	<i>Oxalis corniculata</i>	Creeping wood sorrel	Oxalidaceae	10.00	M
14.	<i>Portulaca oleraceae</i>	Common purslane	Portulacaceae	---	---
15.	<i>Physalis minima</i>	Wild capegooseberry	Solanaceae	14.00	CL
16.	<i>Galinsoga parviflora</i>	Quick weed	Asteraceae	25.00	CL
17.	<i>Eupatorium odoratum</i>	Siam weed	Asteraceae	---	---
18.	<i>Euphorbia geniculata</i>	Mexican fireplant	Euphorbiaceae	23.00	CL
19.	<i>Solanum nigrum</i>	Black night shade	Solanaceae	14.00	MM
20.	<i>Phyllanthus niruri</i>	Seed under the leaf	Euphorbiaceae	11.00	MM
21.	<i>Malvestrum coromandelianum</i>	False mellow	Malvaceae	18.00	CL, VC
22.	<i>Ageratum conyzoides</i>	Goat weed	Asteraceae	15.00	CL
23.	<i>Polygonum plebjum</i>	Spring weed	Polygonaceae	---	---
24.	<i>Datura stramonium</i>	Jimson weed	Solanaceae	---	---
25.	<i>Tridax procumbense</i>	Tridax daisy	Asteraceae	---	---
26.	<i>Achyranthes aspera</i>	Prickly achyranthes	Amaranthaceae	15.00	M, CL, RL
27.	<i>Abutilon indicum</i>	Monkey bush	Malvaceae	15.00	CL
28.	<i>Ocimum canum</i>	Hairy basil	Labiatae	12.00	MM
29.	<i>Argemone mexicana</i>	Mexican poppy	Papaveraceae	---	---
30.	<i>Crotalaria striata</i>	Smooth crotalaria	Fabaceae	10.00	CL
31.	<i>Bidens pilosa</i>	Spanish needle	Asteraceae	15.00	MM
32.	<i>Borreria stricta</i>	Broad button weed	Rubiaceae	---	---
33.	<i>Stachytarpetia indica</i>	Nettleleaf vervain	Verbenaceae	10.00	CL, NL
34.	<i>Leucas aspera</i>	Dead white nettle	Labiatae	---	---
35.	<i>Acanthospermum hispidum</i>	Hispid starrburr	Asteraceae	10.00	MNL
36.	<i>Synedrella nodiflora</i>	Nodeweed	Asteraceae	---	---
37.	<i>Xanthium strumarium</i>	Cocklebur	Asteraceae	15.00	M

CL – Chlorosis of leaf, M – Mosaic, MM – Mild mosaic, MML – Mosaic mottling, MNL – Marginal necrosis of leaves
 NL – Necrosis of leaf, RL – Reduction in leaf size, VC – Vein clearing

necrotic lesions was noted on *Malvestrum coromandelianum* and *Stachytarpetta indica*, respectively (Table 3 and 4).

The results are similar to the report of Lavanya *et al.* (2005), who reported that SNV has wide host range comprising of 15 plant species belonging to Fabaceae, three plant species belonging to Malvaceae, six plant species belonging to Cucurbitaceae, three plant species belonging to Solanaceae and one each belonging to Cruciferaceae and Moringaceae.

Thus, by the above study it can be concluded that these nine plants and twenty four weeds carry virus inoculum and harbour thrips during offseason thereby acting as collateral hosts for both virus and vector. Further, it can be said that these plants also help in perpetuation of thrips, survival and spread of the virus..

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