DEVELOPMENT OF SUNFLOWER NECROSIS VIRUS (SNV) DISEASE IN SOUTH INDIA

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ABSTRACT

Sunflower is the fourth important oilseed crop in India, with the major area concentrated in its southern states viz. Karnataka, Andhra Pradesh, Maharashtra & Tamilnadu. The crop is largely cultivated under rainfed conditions in these states. Besides abiotic stress, the biotic factors *viz.* viral and fungal diseases directly impact the yield. Sunflower Necrosis Virus Disease (SNV) is reported as the most devastating disease in south India. It was observed for the first time in year 1997 at village Bagepally, in Kolar District, Karnataka State. The disease is caused by Tobacco Streak Virus (TSV) belonging to Genus – *Ilarvirus*, Family - Bromoviridae. Natural infection of the virus on peanut, cotton, green gram, okra, soybean and marigold crop has been reported in India. The virus is naturally transmitted through pollen of weed host *viz. Parthenium hysterophorus* with the aid of *Thrips sp.* Temperature between 25-35 ºC and moderate relative humidity is favourable for spread of *Thrips* vector and TSV. Disease incidence is high in wet and winter cultivation. Key field symptoms are distortion and necrosis of leaf, stem and head. Early infected plants remain stunted and develop malformed heads with chaffy or no seeds. Late infected crop has poor seed setting. Yield losses ranging from 30 to 100% have been reported due to SNV disease in South India. Considering the availability of alternate host crops and *Parthenium* weed prevalence throughout the country, there is a potential threat of spread of SNV in central and north India.

Key words: Sunflower, SNV, TSV, *Parthenium*, Thrips

INTRODUCTION

Sunflower is an important oilseed crop in India, besides groundnut, mustard & soybean. It is cultivated on 6.7 million hectares area (Annon. 2014) in the country with majority of cultivation in the Southern states viz., Karnataka & Andhra Pradesh followed by Maharashtra and Tamilnadu. In North India Sunflower is cultivated in state of Punjab and some parts of North Uttar Prasesh in spring season.

The productivity of sunflower is impacted by both abiotic and biotic stresses. Fungal diseases *Alternaria* blight and Powdery mildew occur in wet and winter season respectively. Among the viral diseases, Sunflower Necrosis Virus Disease is one of the most devastating diseases in South India and is observed in both wet and winter season. The disease was observed for the first time in 1997 in a seed production field near the village of Bagepally, Kolar District, Karanataka State, India (Singh et al., 1977). In subsequent years, outbreaks of this disease in major sunflower-growing states of India, especially Andhra, Karanataka and

Maharashtra, have virtually threatened the sunflower cultivation and yield losses ranging from 30 to 100% have been reported (Chander Rao et al., 2000).

EPIDEMIOLOGY & SYMPTOMS

The Sunflower Necrosis disease is caused by Tobacco Streak Virus (TSV) belonging to the Genus – Ilarvirus, Family - Bromoviridae.(Ravi.et.al., 2001). The virus is reported to naturally infect peanut, cotton, green gram, okra, soybean and marigold crop. Weed sp. *Parthenium hysterophorus* is the common alternate host for the virus. The major method of transmission of TSV is by infected pollen, which can spread by wind or carried by insect vector Thrips sp. (Harvir Singh 2005). Transmission of TSV to plants depends on entry of virus from the infected pollen in plant cells through the feeding injury caused by thrips. Temperature between 25-35 ºC and moderate relative humidity is favourable for spread of Thrips vector and TSV. In Southern India, the SNV disease occurs in Wet and Winter season only. The summers being hot (38-45 ºC) does not support effective multiplication of vector and dissemination of virus.

The SNV disease infects the sunflower crop at all growth stages. This results in severe economic loss. Early infected crop at seedling stage, results in necrosis and death of plant. Crop infected in vegetative stage show symptoms like distortion of apical shoot and necrosis of leaf & stem. Such plants remain stunted and develop malformed heads. The infection during flowering stage affects the seed setting and results in chaffy seeds or no seed set. In susceptible hybrids mosaic and yellowing of leaves is also observed.

CURRENT SCENARIO

Sunflower necrosis disease incidence has a variable trend in the southern states. The disease spread was on rise in Karnataka and Andhra Pradesh states, for a decade after its first appearance in 1997. Subsequently it spread to other states in south. With erratic monsoon pattern there has been rise and fall in area of sunflower crop in wet and early winter cultivations. It also impacts cultivation of other alternate hosts of TSV viz. peanut & cotton. Hence variability in disease incidence is noted across years. Also the availability of disease tolerant hybrids in these states has limited the disease spread and severity.

According to disease survey data in the annual report of All India Co-ordinated Research Project on Sunflower- 2014, the sunflower necrosis disease incidence was variable in different sunflower growing districts of southern states. In eastern dry zone of Karnataka *viz*. Chitradurg district the SNV incidence in wet season at vegetative stage was (20-30%) and at flowering stage (40-45%). In northern districts of the state *viz.* Raichur the disease incidence was (5-10%) at vegetative and (20-45%) at full blom stage, in Bagalkote (8-10%) in vegetative and (30-35%) at flowering and in Koppal (1-2%) at vegetative and (15-20%) at full bloom stage. In Tamil Nadu state, among the sunflower growing districts viz. Erode, Tirrupur, Tiruchi, Dindigul, Tirunelveli and Dharampuri, the SNV incidence in Wet season ranged from (1-4%). In Andhra Pradesh, in the major sunflower cultivation district Kurnool; very low disease incidence (0-4%) was recorded at 15 locations surveyed. In Maharashtra, the SNV disease incidence was recorded to be very low (4-8%) at Akola and Latur districts.

FUTURE CHALLENGES

The sunflower crop is cultivated along with other cash crops like peanut and cotton in south and north part of India. These crops are known to harbour Tobacco Streak Virus, which

is causal pathogen of Sunflower Necrosis disease. Weed host *viz. Parthenium hysterophorus* is the reservoir for TSV and acts as inoculum source. The spread and adaptability of this weed host across different geographies is of serious concern. Simultaneous availability of alternate crops and weed hosts with favourable weather conditions for *Thrips* vector can be a vulnerable combination; favouring dissemination and establishment of the virus, in other sunflower growing areas in India. Indeed there is a need to speed up resistant hybrid development program to counter the challenge of Sunflower Necrosis Virus disease in coming years.

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