



# An ICRISAT-NARS Success Story



## Combating a New Virus Menace in Groundnut

### The problem

Millions of smallholder farmers in the rainfed semi-arid tropics of the Indian subcontinent depend on groundnut, sunflower, cotton and vegetable crops for their livelihood.

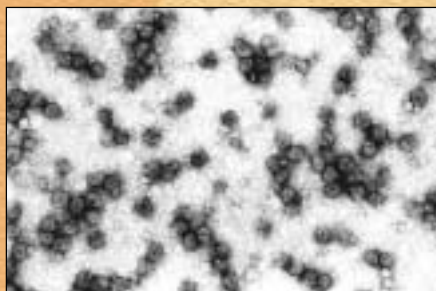
A new threat to groundnut emerged in 2000 in the form of a virus that causes lethal necrosis. The virus came to light in the district of Anantapur, a major groundnut producing area in India. This disease, peanut stem necrosis disease (PSND), destroyed the majority of the crop in the district, leading to losses over \$64 million in 2000 alone.



*PSND in groundnut.*

### The causal agent

ICRISAT and its national agricultural research systems (NARS) partners in India worked together to understand the cause of PSND and to identify strategies to control it. These efforts resulted in identification of tobacco streak virus



*Electron micrograph of TSV particles.*

(TSV) as the causal agent of PSND. The virus was characterized, diagnostic tools were developed, and its transmission in field conditions was studied. Researchers found that TSV is spread by thrips (*Frankliniella schultzei*, *Megalurothrips usitatus*, *Scirtothrips dorsalis*) in the presence of pollen from TSV-infected plants.

TSV threatens a wide array of crops. Besides groundnut, it has been subsequently detected in cotton, okra, cowpea, mungbean, urdbean,

soybean, marigold and sunflower. Sunflower losses in India, for instance, were estimated at \$120 million in 2000.

### Sources of TSV

TSV has wide host range and infects several weeds by producing discernible symptoms. However, weeds such as parthenium, commelina, tridax, *Amaranthus viridis*, *Trianthema portulacastrum* and xanthium do not exhibit symptoms and act as virus reservoirs. Parthenium is widely distributed and plays an important role by providing a continuous supply of infective pollen.



*Sunflower necrosis – a lethal disease caused by TSV.*

Under favorable environmental conditions the virus can spread rapidly from the weed sources through the thrips vectors, contributing to severe disease incidence.

### The solution

TSV is a new virus in India. It can infect a wide range of plants and spreads rapidly in the field. Durable host resistance is scarce or yet to be identified. The following interim management practices were devised to reduce the disease incidence and spread. However, these methods are yet to be validated on farm under high disease situations.





*Parthenium, a pernicious weed widely distributed in India, is a major source of TSV.*

#### *Eliminate weed hosts*

Weeds are major reservoirs of TSV. Eradication of weeds (particularly parthenium, which grows wild in fallow lands, roadsides and fieldbunds) reduces PSND incidence.

#### *Border cropping with tall growing cereals*

Growing 7-11 rows of fast-growing cereals such as pearl millet, sorghum or maize as borders around groundnut acts as a trap for thrips and protects the crop.

#### *Application of insecticides*

Seed treatment with imidacloprid (Gaucho 70 WS) followed by application of systemic insecticide at regular intervals is effective in keeping thrips off the crop. However, insecticide application after the appearance of the disease will not be effective and should not be practiced.

#### *Maintain optimal plant population*

Sub-optimal plant populations leave bare patches in the field, which attract thrips. Maintain optimal plant density to discourage thrips.

#### *Avoid growing TSV-susceptible crops near groundnut fields*

Sunflower, safflower, cowpea, urdbean, mungbean and marigold are susceptible to

TSV and serve as potential inoculum sources. Avoid cultivation of these crops near groundnut fields.

#### *Cultivating resistant varieties*

TSV resistance in groundnut is scarce, but extensive screening has identified tolerance in three cultivated varieties (ICGV 01276, ICGV 92267 and ICGV 99029).

## Summary

- PSND, caused by the TSV, is new disease of groundnut in India.
- TSV infects a wide range of crop and weed species and survives on several weed hosts during off-season.
- Parthenium plays a major role in the perpetuation and spread of the disease.
- Infected pollen and flower-inhabiting thrips also play a major role in disease spread.
- Host plant resistance to TSV is scarce. Crop management practices can mitigate losses and contain disease spread.

## Partners

- National Bureau of Plant Genetic Resources (NBPGR), Hyderabad
- Acharya NG Ranga Agricultural University (ANGRAU), Hyderabad
- National Research Centre for Groundnut (NRCG), Junagadh
- University of Agricultural Sciences (UAS), Raichur
- International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Patancheru

## Donor

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