ICRISAT
Science with a human face
SATrends ICRISAT's monthly e-newsletter

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### 1. Mysterious groundnut disease arrested

During the rainy season of 2000 a new groundnut disease emerged in the Ananthapur district of Andhra Pradesh in southern India, and grew to epidemic proportions. Groundnut is usually grown on 0.7 million ha in Ananthapur, and the disease affected 225,000 ha of the crop. The loss exceeded Rs 3 billion (US$ 65 million), causing economic ruination among the farmers.

Realizing the gravity of the situation, scientists from four research organizations (ICRISAT, Patancheru, National Bureau of Plant Genetic Resources, Rajendra Nagar, Acharya NG Ranga Agricultural University, Kadiri and Anantapur and National Research Centre for Groundnut, Junagadh) with funding support from the National Agricultural Technology Project worked together to identify the causal agent of the disease, to study its epidemiology, and to develop farmer participatory and eco-friendly management practices for its control.

Initially, peanut bud necrosis disease (PBND) was suspected. Subsequent studies of the causal agent confirmed that the new disease was caused by tobacco streak ilarvirus (TSV). It was named peanut stem necrosis disease (PSND). Although PSND and PBND are caused by two distinct viruses belonging to the Ilarvirus and Tospovirus groups respectively, the symptoms produced by them on groundnut are very similar. Techniques have been developed for the precise diagnosis of the disease by ELISA and by the reaction of indicator hosts.

*Healthy vs. sick plants in a glasshouse experiment*

The typical symptoms of PSND are necrosis of leaflets and terminal bud, which spreads rapidly to the entire stem. TSV infects several economically important crop plants (sunflower and marigold) and survives on many weed hosts. Parthenium, a widely distributed weed, is a symptomless carrier of TSV and plays a major role in the perpetuation and spread of PSND. All the three thrips species (Frankliniella schultzei, Scirtothrips dorsalis and Megalurothrips usitatus) are experimentally shown to transmit TSV when in the presence of infected sunflower, marigold and Parthenium plants.

Management practices that could help control PSND include:

- removal of weeds, particularly Parthenium in and around fields,
- border cropping and intercropping with cereal crops such as pearl millet, sorghum or maize, which act as a barrier for wind borne thrips and the inoculum carried by Parthenium pollen
- absence of sunflower and marigold in the vicinity of groundnut crops as these harbor the virus
- optimum plant population to obtain quick ground cover which discourages thrips from landing on groundnut plants, and
- seed treatment with Imidacloprid 200 SL @ 2 ml kg-1.

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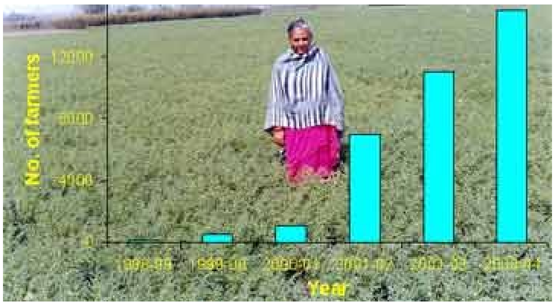
### 2. Managing the mold

In 1997 life was indeed bleak for Krishna Kumari Shreshtra and her fellow farmers of village Lalbandi in Nepal. The chickpea crop on which their livelihoods depended was devastated by Botrytis grey mold (BGM), caused by *Botrytis cinerea* Pres. ex Fr. Stories about similar catastrophes were also coming in from neighboring India, Pakistan and Bangladesh, and from as far away as Australia and Canada.Since stable sources of host plant resistance to BGM had not been identified for chickpea, management of the disease relied heavily on fungicides through seed dressing and foliar sprays. Chemical control of BGM had not been widely adopted by resource-poor farmers in many countries including Nepal.An integrated disease management (IDM) of the disease was needed.

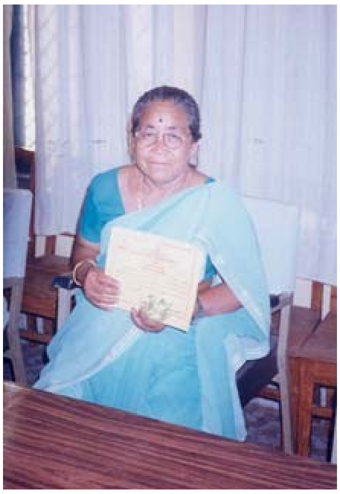
ICRISAT scientists developed an effective IDM technology against BGM.Using an improved ICRISAT cultivar of chickpea, ICC 14344 (Avarodhi), they decided on wider row spacing. This allows more aeration and suppresses the development of micro-climates conducive to fungal growth. Next, scientists armed the seed by treating it with Thiram + Bavistin (1:1) @ 2 g kg$^{-1}$seed, soil application of *Rhizobium* (210 g ha$^{-1}$) to ensure nitrogen fixation, diammonium phosphate (100 kg ha$^{-1}$) to boost initial growth, foliar application of the micronutrient boron (whenever needed @ 500 g ha$^{-1}$) and need-based foliar spray of carbendazim to control BGM.

*A healthy seed production field after using the*

*recommended IDM*




It was now time to validate the technology. ICRISATin collaboration with the Department for International Development, Nepal Agricultural Research Council, Department of Agriculture and non-government organizations, did this through a farmer participatory approach in 18 villages of 11 districts of Nepal.The success of the validation was seen in the significant reduction of BGM severity. This led to a 2 to 3-fold increase in grain yield and resulted in increase of net profit to NRs. 38,405 (US$ 590.8).



Backed by this heartening response, on-farm trials were started with 110 farmers in 1998-99.By the 2003-04 season more than 15,000 farmers in Nepal had adopted the technology with the establishment of village level seed production systems run mainly by women's self-help groups.This integrated management technology has been successfully established in the rice-fallows of the Indo-Gangetic Plains in India and Bangladesh, which resulted in doubling the farm income.

*Krishna Kumari Shreshtra with her award*.

Krishna Kumari Shreshtra won the prize winner for producing 4 tons/ha of chickpea, the highest in the area.Her smile is not for the prize alone, she basks in the confidence that the dreaded BGM is not a threat any more!

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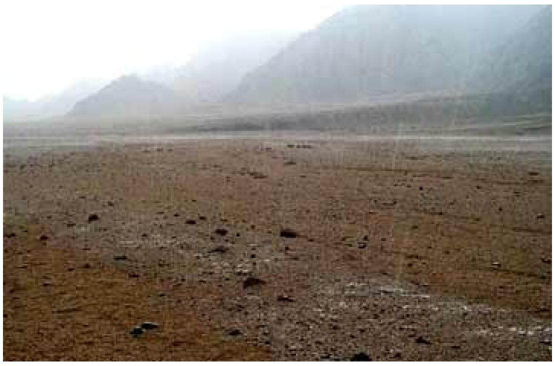
**3. Lets talk about the weather!**

ICRISAT has developed a new learning module on crop-weather relationships as part of the VASAT activities. This is consistent with generating literacy-type learning materials on a range of topics related to water, climate/weather phenomena, and crop/livestock management under water-limiting conditions. The current module is useful for lead farmers, agricultural extension personnel and others interested in practical agriculture.

There are 7 modules in this course which teaches the importance of weather and climate on crop production, how to determine the climatic requirements of some crops, and to understand and interpret weather forecasting for various agricultural operations. Brief descriptions of each module are given below.

*The weather plays a very important role in agriculture.*



The module is under review by well-known subject matter experts and leaders in open/distance learning.

Module 1: Importance of Crop-Weather Relationships This module gives the details of the factors responsible for (1) seasonal loss of agricultural production (2) loss of future livelihood potential (3) immediate loss of life, and (4) infrastructure and high societal costs for disaster.

Module 2: Climate vs.Weather
The two lessons in this module (1) Climate Vs. Weather (2) List of weather elements helps to understand the difference between the Climate and Weather, and the influence of important weather elements on crop production.

Module 3: Weather Elements
This module give the details about important weather elements.

Module 4: Weather and plant growth
This module teaches us how the important weather elements influence the growth and development of crop plants and yield.

Module 5: Climatic Requirements of Some Crops
The 6 lessons in this module give details about required rainfall, critical stages and temperature conditions of some crops.

Module 6: Weather Forecasting
This module provides answers to the following questions:

How weather forecasting is useful? What is the aim of weather forecasting? What is weather forecasting? How weather is predicted? How reliable is weather forecasting? What types of weather forecasting exist? How to get information on weather forecasts? and How simple techniques help in predicting weather?

Module 7: Interpretation of Weather for Agricultural operations

This module gives information about optimum conditions of temperature, soil moisture in terms of earlier rainfall, present rainfall, and wind for different farm operations such as land preparation, sowing, transplanting, fertilizer application, irrigation, spraying and dusting, and harvesting.

At the end of the each module exercises are provided to help in gauging how much knowledge was acquired.

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