Volume 23 No. 2 ISO 9001:2008 Organization ISSN 2394-3289 April-June 2017

हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद
Agrisearch with a human touch

भाकृअनुप
ICAR

ICAR NEWS

A SCIENCE AND TECHNOLOGY NEWSLETTER

RESEARCH UPDATE

PROMISING TECHNOLOGIES

Sett way of growing sugarcane for fungal treatment

Owing to practical difficulties in handling voluminous planting material (setts) in sugarcane, the increased duration of fungicide treatment, although effective to manage important fungal diseases could not be practiced.

To address this issue, a modified fungicide treatment through low pressure diffusion technique in a short duration of treatment was evolved with a lab prototype at ICAR-SBI, Coimbatore. The prototype was validated for sett treatment with fungicides and microbes (*Pseudomonas fluorescens, Azospirillum*, *Glucanoacetobacter* and *Phosphobacterium*) for disease management and growth promotion. During the evaluation for various inputs, the results on tissue bioassay, green house and field experiments indicated that the uptake and efficacy of fungicides/ microbes was found to be similar for both the methods of treatment

Sett treatment devices are in operation for effective treatment of fungicides in sugarcane setts to manage red rot and smut.

Indian Council of Agricultural Research
Krishi Bhavan, New Delhi 110 001, India
www.icar.org.in

in terms of disease control and growth promotion. The principle involved in STD is vacuum infiltration by creating a negative pressure followed by absorption of the chemicals inside the setts. This novel mechanized sett treatment technology has been filed as a patent (Malathi et al. 3323/CHE/ 2011- The patent office Journal 21/06/ 2013) as 'Rapid treatment for planting materials of sugarcane and other vegetatively propagated crops".Subsequently, new units of different sizes were developed in collaboration with ICAR-CIAE-RS, Coimbatore and validated for the management of fungal diseases with fungicides/ microbes and agro inputs for raising healthy nursery. For management of red rot, smut and wilt, along with sett treatment, other delivery methods viz., soil application, spray and delivery of fungicides through micro-irrigation systems were evaluated.

Larger unit of Sett treatment

Mechanized means of sett treatment

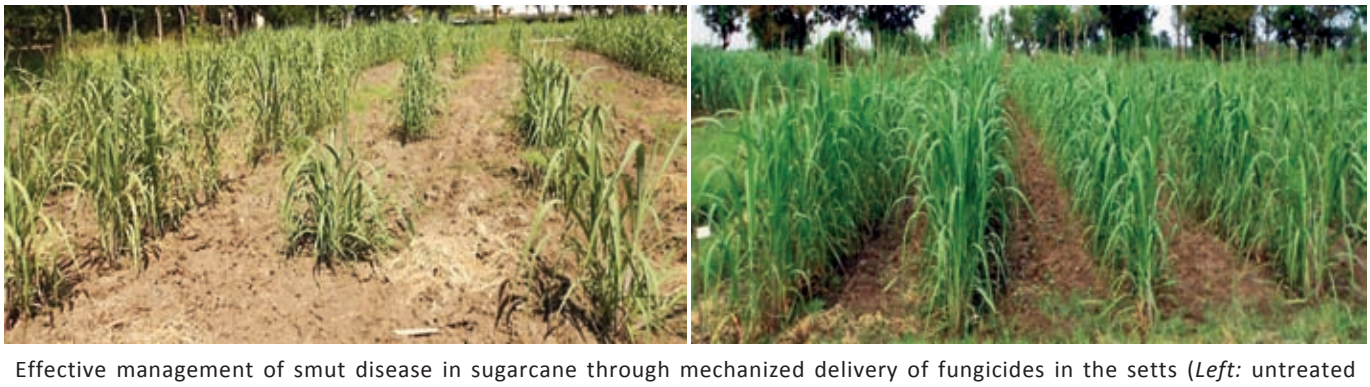
Two/ three budded sugarcane setts were treated with fungicides using the sett treatment device (STD) for field experiments on disease management, while for healthy nursery programme, delivery of different kinds of inputs *viz.,* agrochemicals and microbes (fungicides, insecticides, inducers, micro and macro nutrients, growth hormones, chemicals for abiotic stress tolerance, biocontrol agents, growth promoting bacteria / biofertilizers) were treated in different concentrations and combinations. This method was performed at prescribed vacuum level and duration (15-20 min) in the newly fabricated units.

Disease management

Detailed field trials to manage red rot in susceptible cvCoV 09356 in disease endemic region in Cauvery delta in Tamil Nadu during 2014-15 and 2015-16, indicated that this treatment was able to protect the setts from soil-borne inoculum of red rot and significantly improved the plant survival under sick plot conditions. Due to better crop stand and reduced disease incidence, cane yield increased significantly in the treated plots. Similarly, with 100 % smut-affected seed cane, delivery of the fungicide propiconazole (100 ppm) through sett treatment device caused drastic reduction in whip emergence and a healthy crop stand, and improved cane yield by 52%.

Mechanized sett treatment for healthy nursery programme

Apart from delivering fungicides and biocontrol agents through the mechanized sett treatment device, studies showed that the mechanized treatment with a mixture of 0.5% super lime, 0.5% urea and 0.1% carbendazim was highly effective in producing vigorous quality settlings as compared to 2.5% concentration of super lime and urea in the conventional sett dipping practices. Overall, in the new method, the dose of the chemicals was reduced by 1/10th from conventional dipping and it was further reduced for combined application. Production of high quality settlings was significantly high at the recommended doses of fungicide, insecticide and nutrients also at stipulated vacuum level was validated at sugar factory locations. Depending on the unit, the vacuum level varied from 200-350 Hg/ mm, which had to be optimized without affecting the germination.



Effective management of smut disease in sugarcane through mechanized delivery of fungicides in the setts (*Left:* untreated plot with poor establishment; *Right:* treated plot showing excellent crop stand)

Under field conditions the disease problems remain due to breakdown of varieties to the pathogens or continuously growing of susceptible varieties in the region. Hence there is need to reduce the damages caused by the diseases till a varietal replacement is made. To manage the diseases through fungicides, an optimized effective delivery of fungicides in single bud or two budded setts/ bud chips has been developed utilizing mechanized-vacuum infiltration approach and the treatment has resulted in more effective diffusion of the chemicals into sugarcane setts / buds due to reduced pressure created in the treatment chamber. The newly devised sett treatment device is portable and easy to operate. Recycling of the chemicals resulted in huge savings in chemical usage for pre-treatment. Field trials conducted at ICAR-SBI and disease endemic locations showed that effective delivery of fungicides through the new device efficiently protected the crop from red rot, smut and wilt. By effective sett treatment, both soil- and sett- borne inocula of the pathogens were killed or inactivated, thus resulting in a significant reduction in disease development.

By treating the planting material with different inputs through simple, rapid and cost effective method, the industry will be able to produce good quality settlings

Production of vigorous sugarcane settlings in the nurseries after mechanized treatment of single buds with fungicide, insecticide and nutrients

with improved germination, growth promotion and tolerance to abiotic stresses. It is expected that adoption of this new approach will effectively manage sugarcane diseases and help to produce healthy seedlings to sustain sugarcane productivity.

R. Viswanathan[1*], P. Malathi[1], C. Naveen Prasanth[1], Ravindra Naik[2], and **S.J.K. Annamalai[2]**
[1]Crop Protection Division, ICAR-SBI, Coimbatore 641 007;
[2]ICAR-CIAE, Regional Centre, Coimbatore 641 007
**e-mail:* r.viswanathan@icar.gov.in

Magnetic field: Physical techniques for enhancing growth and yield in tomato

Magnetic field is one of the physical pre-sowing seed treatment which is not only cost effective but also significantly improves the yield without any adverse effect on environment. Its impact on the seeds can change the processes taking place in the seed and stimulate plant development. In the experiment conducted at IARI, New Delhi, seeds of tomato were exposed to a magnetic field of 50 mT, 100mT and 120mT for 5, 10, 15, 20, 25 and 30 minute in a cylindrical shaped sample holder, made of non-magnetic thin transparent plastic sheet. The required strength of the magnetic field was obtained by regulating the current in the coils of the electromagnet. Gauss meter was used to measure the strength of the magnetic field between the poles. The germination test was carried out following the method of ISTA (1985). Results indicated that exposure of tomato seeds to different magnetic field intensities increased significantly all of its germination related character. Germination percentage improved by 2-16%, the shoot length 0-16%, the root length 2 to 33%, the total seedling length 6-19% and the seedling dry weight 0-17% in different treatments of magnetic field as compared to corresponding value in untreated control. The calculated vigour indices I and vigour indices II also increased by 12-39% and 4-32%, respectively, in different treatments of magnetic field as compared to corresponding value in untreated control. Among the opted magnetic treatments 100 mT for 30 minutes was found the most effective in increasing most of the seedling parameters. Tomato seeds exposed to magnetic field of 100 mT for 30 minutes and seedling