

# TECHNICAL BULLETIN

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## Disease Management for Productivity Enhancement of Sugarcane

In Bangladesh, Sugarcane is a cash and food-cum-industrial crop. Approximately 4.0 million people are engaged in the Sugarcane Agro-Industry growing the Sugarcane crop and producing sugar, goor (molasses), etc. About 60% of the Sugarcane crop is used for juice and goor preparation and chewing purposes. However, the average yield of Sugarcane in Bangladesh is around 46 t ha<sup>-1</sup> which is well below the world average of 65 t ha<sup>-1</sup>. This relatively low yield of Sugarcane in Bangladesh is attributed to, among other things, diseases, especially the red rot disease, that sometimes cause total crop losses. Due to severe disease and insect infestations in the ratoon crop, the yield of ratoon cane is much lower than that of the plant cane. In the country, Sugarcane is grown in two different zones, the mill zone and the non-mill (or goor and chewing cane) zone. Most of the cane growers in the goor and chewing cane zone are not aware of the different diseases of Sugarcane and proper measures for their management. Partial or total damage of Sugarcane grown with seeds infected with red rot and other diseases occurs every year. Disease incidence could be minimized by planting properly treated seeds and adopting other management procedures. In view of this, Bangladesh Sugarcrops Research Institute (BSRI) conducted a three-years (2015-2018) research project with the objectives of developing an appropriate management package for managing the major diseases of goor and chewing type Sugarcane to increase the productivity of plant and ratoon crops Sugarcane in the non-mill zones.



On-farm trial on disease management in Sugarcane at Singair, Manikganj

### Methodology

The project was implemented in farmers' fields in the goor and chewing cane zones. The Shibganj upazila of Chapai Nawabganj district and Sirajganj Sadar upazila of Sirajganj were chosen as the goor zone, Singair upazila of Manikganj as the chewing zone and Kalia upazila of Narail were chosen as both goor and chewing cane zones. The same experiment was conducted in the experimental plots of BSRI, Ishurdi.



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Two Sugarcane varieties, one for goor (Isd 37) and the other for chewing (BSRI Akh 41) were used in the trials. The experimental treatments were: T<sub>1</sub> moist hot air treatment (MHAT) of seeds (sett), at 54°C, 95% RH for 4 hours and sett dipping in 0.2% solution of the fungicide Bavistin 50 WP for 10 minutes; T<sub>2</sub> roguing of disease infected clumps and removal of older leaves; T<sub>3</sub> T<sub>1</sub> + T<sub>2</sub>; T<sub>0</sub> control (no sett treatment and no roguing nor removal of older leaves). Recommended doses of fertilizers were applied and appropriate intercultural practices like timely and sufficient irrigation, insect pest control, mulching, weeding, earthing up, etc. were done as and when necessary. In the 2<sup>nd</sup> year, the experiments were repeated in other farmers plots using seed materials from different treatment plots of the first year to observe the efficacy of disease management practices in the second generation crops. The seed materials under T<sub>1</sub>, T<sub>2</sub> and T<sub>3</sub> were treated with fungicide only. After harvest of the 1<sup>st</sup> year's crop, the plots were kept for ratoons to observe the efficacy of disease management practices in the 1<sup>st</sup> ratoon crop. In the 3<sup>rd</sup> year, seed materials from different treatment plots of previous year's experiments were used to observe the efficacy of disease management practices in the 3<sup>rd</sup> generation crop. After harvest of the 1<sup>st</sup> ratoon, the plots were kept for the 2<sup>nd</sup> ratoon to observe the efficacy of disease management practices in the 2<sup>nd</sup> ratoon crop.

### Results and Outputs

Seed treatment by MHAP and fungicide followed by roguing of disease infected clumps and removal of older leaves was found to be effective in controlling the major diseases of Sugarcane resulting in considerable increases in millable cane yield and brix of both the varieties, Isd 37 and BSRI Akh 41, under both plant and ratoon conditions (1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> generations and 1<sup>st</sup> and 2<sup>nd</sup> ratoons). The average yield levels of Isd 37 and BSRI Akh 41 plants and ratoons were higher by 24.87-33.35% and 28.64-42.28% respectively than those of without treatments. The brix % in the treated plots increased by 5.71-8.18 % over control.

Efficacy of disease management practices on yield and brix content of cane in the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> generations and in the 1<sup>st</sup> and 2<sup>nd</sup> ratoons of goor and chewing type Sugarcane varieties in non-mill zones and at BSRI farm

Variety	Treat	Yield of cane (t ha <sup>-1</sup> )*							Brix (%)
		1 <sup>st</sup> gen.	2 <sup>nd</sup> gen.	3 <sup>rd</sup> gen.	1 <sup>st</sup> rat.	2 <sup>nd</sup> rat .	Avg.	% incr. control	
Isd 37									
	T <sub>0</sub>	102.25	101.92	97.42	82.26	66.03	89.97	-	18.20
	T <sub>1</sub>	122.07	128.37	110.97	112.52	87.82	112.35	24.87	19.24
	T <sub>2</sub>	113.57	107.73	103.92	93.09	68.72	97.40	8.25	18.48
	T <sub>3</sub>	128.42	135.95	124.17	119.69	91.68	119.98	33.35	19.58
BSRI Akh 41		Yield of cane (tha <sup>-1</sup> )**							
	T <sub>0</sub>	116.76	102.02	81.18	68.83	53.11	84.38	-	18.46
	T <sub>1</sub>	154.16	123.56	100.98	88.89	75.18	108.55	28.64	19.50
	T <sub>2</sub>	128.10	108.04	87.25	77.03	58.20	89.72	6.32	18.70
	T <sub>3</sub>	171.63	136.64	111.31	97.95	82.79	120.06	42.28	19.97

\* Average of 18 replications; \*\* Average of 12 replications

## Benefits and Outcomes

Heat treatment destroyed or inactivated the disease causing organisms in seeds of Sugarcane and protected the crop from major diseases like red rot, smut, ratoon stunting and white leaf. Moreover, fungicide treatment of setts protected the crop from sett rotting fungus, and finally, roguing of disease infected clumps and removal of older leaves helped reduce disease incidence.

The number of millable cane in the treated plots of the chewing variety BSRI Akh 41 increased by 20000 to 22000 ha<sup>-1</sup> over control, which could fetch an additional Tk. 2,40,000.00 to Tk. 2,64,000.00 (@ Tk.12/cane). In case of the goor variety Isd 37, the yield of cane increased in the treated plots by 24.87-33.35 t ha<sup>-1</sup> over control plots in the plant and ratoon crop, which could produce at least 3.00 t ha<sup>-1</sup> of goor (@ 10% goor production) worth Tk.1,80,000.00 ha<sup>-1</sup> (@ Tk.60/kg goor). The average yield of cane in the treated plots was 120 tha<sup>-1</sup> which was much higher than the national average of 48 t ha<sup>-1</sup>. Using disease management measures described here, farmers can earn at least Tk. 1,80,000.00 - Tk. 2,64,000.00/ha<sup>-1</sup> additionally by way of enhanced cane/goor production. The technology developed by the project is environmental friendly and socio-economically viable.



**MHAT treated sugarcane in a farmer's field**

## Expected Impact

The project developed and standardized a package for sugarcane disease management which has the potential to boost Sugarcane production and enhance cane growers' incomes.

## Recommendations

- ❖ Large scale production of foundation seed (FS) and certified seed (CS) of Sugarcane through piloting the recommended technology in mill and non-mill zones is needed for creating awareness of the Sugarcane growers for disease control and production enhancement.

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This technical bulletin has been prepared on the basis of technical information available from a completed CGP project of KGF, the details of which are given below:

**Project Code and Title:** TF TF-22-PS/15. Productivity enhancement of *goor* and chewing type sugarcane through management of major diseases in non-mill zones,

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