

Strategies to mitigate sugarcane global warming consequences in Punjab, India

Rajan Bhatt*

Punjab Agricultural University, Ludhiana, Punjab 141 004

Global warming is the topical issue under which temperature projected to rise from 1.1 to 2.9°C (low emission) or 2.0 to 5.4°C (high emission) by 2100 relative to 1980–1999. Global warming increasing the frequency and intensity of extreme weather events viz. erratic rainfalls, floods, droughts, acidification of oceans etc., which further affected the photosynthesis, transpiration, respiration, enzymatic regulations and finally land and water productivity. Some adaptation and management strategies which could be followed in sugarcane growing areas to mitigate the consequences of the global warming have been discussed here.

Keywords: Global warming, Punjab Sugarcane

SUGARCANE is the only tall growing grass with sugar rich stalks, important worldwide for the sugar and bio-energy. In production, India ranked 2nd after Brazil in sugarcane production. In Punjab, sugarcane occupied an area of 96 thousand hectares during 2017-18. The average cane yield was 836 q/ha (338 quintal acre⁻¹). The average sugar recovery was 9.78%. Sugarcane during germination stage requires warm and moist weather while hot and dry weather required from tillering phase to harvesting. Being C4 crop sugarcane has limited scope from enhanced CO₂ levels than C3 crops viz. wheat, rice etc. has higher scope.

Strategies to mitigate global warming through sugarcane

Following are some of the adaptation and management strategies which could be followed to mitigate the consequences of the global warming

- Do not sow single/un-recommended cultivars. For better sugar recovery sown early (COPB 92, CO 118, COJ 82 and COJ 64) and medium-late cultivars (COPB 93, COPB 94, CO 238, COPB 91 and COJ 88) in the ratio of 3:2. Under early varieties, Spring: Autumn should be planted in the ratio of 2:1, while proportion of ratoon crop: seed crop must be maintained as 1:1.
- Proper time of sowing for spring sugarcane is from mid-February to the end of March while for autumn crop is 20 September to 20 October with seed rate of 30-35 qt acre⁻¹ for most cultivars except Co 118 and CoJ 85, which required 10% higher seed rate due to thick canes. Seeds should be soaked in water for 24 hour for the better germination.
- Proper spacing is a must to maintain the canopy temperature, therefore under trench planting sow sugarcane in rows 75 cm apart and 20-25 cm deep trenches while under paried row trench planting Plant two rows of sugarcane 30 cm apart with 20-25 cm deep trenches and distance between two trenches should be 90 cm.
- Fertilizers more particularly N will be timely applied and that too based on the soil test basis. To seed and ratoon crop, applied 130 kg acre⁻¹ and 195 kg acre⁻¹ of urea in two and three splits respectively with drill and applied single super phosphate 75kg acre⁻¹ below the cane sets in furrows. However, under Punjab conditions, sugarcane does not respond to potash. Reduce the dose of urea to 100 kg acre⁻¹ if sown after the potato crop. Spray the crop 2 or 3 times with 1% solution of ferrous sulphate at weekly intervals if symptoms of iron deficiency appear.
- Integrated nutrient management viz. farmyard manure or press-mud @ 8t ha⁻¹ along with 90 kg acre⁻¹ of urea fertilizers two weeks before sowing of sugarcane sequesters higher fractions of carbon and helps the canes to bear the adverse consequences of the global warming.
- Application of azotobacter/consortium biofertilizer @ 4 kg/acre in the furrows at the time of planting would be helpful in increasing the cane yield even under adverse weather conditions
- Dams, canals, underground pipelines, drip system should be

properly developed as water stress is an important consequence of global warming, therefore efficiency water use must be enhanced. Drip irrigation reported to save upto 30-50% irrigation water with higher land productivity. Paired row (30:120 cm) planted sugarcane should be drip irrigated every third day with a lateral pipe placed 20 cm deep and 150 cm apart having dripper spacing 30 cm. Dripper discharge of 2.2 lt hour⁻¹ should be provided. Start fertigation of 104 kg urea per acre for plant crop and 156 kg urea per acre for ratoon crop in the month of April and complete in 90-100 days in 10 equal splits.

- Approach *viz.* mulches @ 20-25 qt acre⁻¹ during tillering phase, reduced soil temperature, reduces vapour lifting capacity of the air, conserves soil moisture, suppresses weeds and reduces the incidence

of shoot-borer. Further, Fertigation to improve nutrient and water use efficiency and inter-cropping of Potato, Wheat, Raya, Gobhi Sarson, Toria, Cabbage, Reddish, Peas, Gram and Garlic in sugarcane further improve livelihood of the farmers.

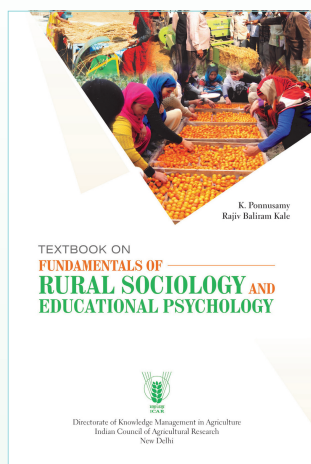
- Weed compete with sugarcane plants for sunlight, nutrients and water and responsible for stunted canes, reduces millable canes and produces juice quality. Farmers are encouraged to use recommended weedicides *viz.* 800 g acre⁻¹ Karmex/Klass 80 WP (diuron) in 200 litres of water within 2-3 days of planting effectively controls the broadleaf weeds, annual grasses and hardy weed like Bans Patta. For dila apply 800 g acre⁻¹ 2, 4-D sodium salt 80 WP after dissolving in 200 lts of water.
- Properly managed ratoons helped in mitigating the adverse effects of climate change as ratoon with

more developed root system and with early developed canopy withstand adverse temperature and moisture conditions better than the plant crop.

Finally, to mitigate the consequences of global warming *viz.* elevated levels of CO₂, temperature and water stress, sugarcane farmers must adopt new recommended cultivation techniques and cultivars with desired characteristics (tolerance to water, salt and temperature stress, stomatal conductance under CO₂ prevalence, root and shoot development, resistance to leaf scald, ratoon stunting disease and smut, and insect pest *viz.* top borer, pyrilla and internode borer) for harvesting potential land and water productivity of sugarcane in the state even under the era of climate change.

*Corresponding author's e-mail: rajansoils@gmail.com

Textbook on Fundamentals of Rural Sociology and Educational Psychology



India being a land of villages, rural sociology and educational psychology is an essential theme for agricultural students and professionals. Rural sociology deals with rural society and the relations of people who live in villages. Rural sociology presents a scientific picture of rural life.

Extension workers work with farmers very closely in their settings for which their understanding of rural background and farmers' psychology is very essential. Extension professionals should have necessary knowledge of the precise approaches and methods of dealing with farmers. Rural sociology can help professionals in organizing the rural structure in a constructive manner.

This textbook consists of fundamental facts of rural sociology. The book has twenty two chapters covering both rural sociology and educational psychology out of which twelve chapters consist of rural sociology and ten chapters deal with educational psychology. In this text book, emphasis has been given on various aspects of educational psychology also. It provides all the relevant information in the field of rural sociology with special emphasis on Indian culture, merits and demerits of Indian rural societies, the stressful conditions under which farmers live and work. The book will be a good basis of information reference for agriculture students, psychology students besides extension practitioners, research scientists, KVKs and agricultural colleges.

TECHNICAL SPECIFICATIONS

No. of pages : i-viii + 252 • Price : ₹ 450 • ISBN No. : 978-81-7164-181-9

For obtaining copies, please contact:

Business Unit

Directorate of Knowledge Management in Agriculture
Krishi Anusandhan Bhavan-I, Pusa, New Delhi 110 012
Tel : 011-25843657, Fax 91-11-25841282; e-mail : bmicar@gmail.com