The Bioscan 18(1): 35-37, 2023
AN INTERNATIONAL QUARTERLY JOURNAL OF LIFE SCIENCES
www.thebioscan.com

# INFLUENCE OF DIFFERENT SETT TREATMENT TECHNIQUES ON YIELD, QUALITY AND ECONOMICS OF THE SUGARCANE

**A. S. PATIL*AND G. R. PAWAR**
Department of Agriculture Science and Technology,Vasantdada Sugar Institute, Pune - 412,307 ,INDIA
e-mail: abhi9445patil@gmail.com
ORCID ID:htpp://orcid.org/0009-0006-3302-3032

**KEYWORDS**
Sugarcane
Sacuum technique
MHAT
Sett treatment

**Received on :**
10.01.2023

**Accepted on :**
20.03.2023

***Corresponding author**

**ABSTRACT**
The field experiment was carried out, during 2017-18, 2018-19 and 2019-20 to evaluate the influence of different sett treatment techniques on yield, quality and economics of the sugarcane at R and D farm, Vasantdada Sugar Institute, Manjari, Pune. The treatments comprises agro chemicals *viz*. carbendazim 0.01%, Imidacloprid 0.003%, bio inoculant includes consortia of nitrogen fixing bacteria, as well as bio stimulants *viz*. Ethrel 50 ppm, oligochitosan 100 ppm were applied manually and by vacuum pressure technique (200 mm Hg for 20 min.) and sett treated with Moist Hot Air at 54°C for 150 min. Single buds setts of var. VSI 08005 were used for imposing treatments and planted in protrays. The experiment was laid out in completely randomized block design with three replications. Based on results of the experiment significantly higher cane yield (171.17 t/ha), sett yield (8.66 lakh/ha two budded setts) and Benefit:Cost ratio (1:2.77 by cane yield and 1:6.44 by sett yield) was obtained in sett treated with Moist Hot Air at 54°C for 150 min. Sett treated with Ethrel (50 ppm) manually and by vacuum pressure technique showed superior germination.

## INTRODUCTION

Sugarcane is a major industrial crop of the country grown in both tropical and subtropical regions. Under various climatic conditions, sugarcane experiences number of biotic and abiotic stress during its growth. Effective management of any stress is associated with the practicability of management practice. For management of most of diseases, improving germination and alleviating the stress, sett treatment plays a major role in easy, effective, economical and rapid method of delivering agrochemicals/microbes or bio stimulants. Pre-sowing treatment of the seed stimulate germination and subsequent seedling growth both under normal and saline soil conditions (Idris and Aslam,1975). Sugarcane is planted through setts for the establishment of commercial fields. In recent days, cost of production is becoming high due to increasing labour cost and other inputs including seed. In sugarcane cultivation, seed is one of the costlier input and accounts for nearly 25 % of the total operational cost in sugarcane. Under irrigated conditions, generally 40,000 three bud setts from 10 ton $ha^{-1}$ of seed crop or top 1/3rd portion of healthy matured cane is recommended for sugarcane. (Patel and Patel, 2014). However, treating sugarcane setts manually is impractical due to their high volume and a longer soaking period. Hence a practically feasible, rapid and effective delivery system having long-term effect is required under field conditions. In this direction the study was carried out to test the different agrochemicals as well as the microbes for sett treatment manually as well as mechanically using a vacuum pressure device or moist hot air treatment and also to access its effect on yield, quality and economics of sugarcane. Hence the present investigation was carried out to reduce the cost of production through seed cane economy technologies.

## MATERIALS AND METHODS

The field experiment was conducted from 2017-18 to 2019-20 at Vasantdada Sugar Institute, Pune, Maharashtra. The treatments comprises agro chemicals *viz*. carbendazim 0.01%, Imidacloprid 0.003%, bio inoculant includes consortia of nitrogen fixing bacteria, as well as bio stimulants *viz*. Ethrel 50 ppm, oligochitosan 100 ppm were applied manually and by vacuum pressure technique (200 mm Hg for 20 min.) and sett treated with Moist Hot Air at 54°C for 150 min. Single buds setts of var. VSI 08005 were used for imposing treatments and planted in protrays. The germination was recorded at 30 days of planting in protrays. All the recommended agronomical practices were followed to raise a healthy crop (Sundara 1998).The experiment was laid out in completely randomized block design with three replications at R and D farm, Vasantdada Sugar Institute, Pune. Plot yield at harvest was recorded by actual weighing the cane samples from net plot and extrapolated to cane yield t/ha. Cane juice at harvest was extracted using power operated crusher and clarified using lead acetate. The juice quality parameters *viz*., juice brix %, juice sucrose %, commercial cane sugar (CCS) % and purity % was worked out as per Chen and Chou (1993). The analysis of variance (ANOVA) for the data collected was analyzed as per Panse and Sukhatme (1978) and tested at 5 per cent level of significance to interpret the treatment differences.

## RESULTS AND DISCUSSION

**Effect on Germination percentage**

**Table1 : Germination and yield as influenced by different sett treatment techniques**

| Treatments | Germination % at 30 DAP | Cane yield (t/ha) | Sett yield (lakh/ha) | CCS (t/ha) |
|---|---|---|---|---|
| T1: Sett treatment with 0.01% Carbandazim + 0.003% Imidacloprid using vacuum technique | 75.39 | 149.84 | 7.69 | 19.03 |
| T2: Sett treatment with 0.01% Carbandazim + 0.003% Imidacloprid manually | 76.58 | 140.03 | 7.38 | 18.49 |
| T3: Sett treatment with Consortium of Endophytic Nitrogen Fixing Bacterial Bioinoculant using vacuum technique | 78.17 | 147.61 | 6.71 | 15.64 |
| T4: Sett treatment with Consortium of Endophytic Nitrogen Fixing Bacterial Bioinoculant manually | 76.58 | 129.91 | 6.3 | 17.18 |
| T5: Sett treatment with 0.01% Carbandazim + 0.003% Imidacloprid + Consortium of Endophytic Nitrogen Fixing Bacterial Bioinoculant using vacuum technique | 86.5 | 158.83 | 7.38 | 19.59 |
| T6: Sett treatment with 0.01% Carbandazim + 0.003% Imidacloprid + Consortium of Endophytic Nitrogen Fixing Bacterial Bioinoculant manually | 78.17 | 145.69 | 6.41 | 18.48 |
| T7: Sett treatment with Ethrel (50 ppm) with vacuum technique | 91.26 | 146.57 | 7.51 | 18.55 |
| T8: Sett treatment with Ethrel (50 ppm) manually | 88.49 | 122.69 | 7.67 | 13.38 |
| T9: Sett treatment with Oligokitosan biostimulator (100 ppm) with vacuum technique | 84.52 | 153.83 | 7.39 | 20.53 |
| T10: Sett treatment with Oligokitosan biostimulator (100 ppm) manually | 81.34 | 136.74 | 7.22 | 17.33 |
| T11: Sett treatment with Moist Hot Air at 54°C for 150 min | 60.47 | 171.17 | 8.66 | 19.95 |
| T12: Control- Without sett treatment | 71.42 | 102.25 | 5.46 | 13.12 |
| Sem ± | - | 11.82 | 0.44 | 1.84 |
| C.D. @ 5% | - | 34.66 | 1.3 | NS |
| CV% | - | 14.41 | 10.8 | 18.07 |

**Table 2: Quality and economics as influenced by different sett treatment techniques**

| Treatments | Brix (%) | Sucrose (%) | CCS (%) | B:C ratio by yield | B:C ratio by setts |
|---|---|---|---|---|---|
| T1: Sett treatment with 0.01% Carbandazim + 0.003% Imidacloprid using vacuum technique | 19.7 | 17.87 | 12.68 | 2.42 | 5.71 |
| T2: Sett treatment with 0.01% Carbandazim + 0.003% Imidacloprid manually | 20.22 | 18.51 | 13.19 | 2.27 | 5.51 |
| T3: Sett treatment with Consortium of Endophytic Nitrogen Fixing Bacterial Bioinoculant using vacuum technique | 19.38 | 17.31 | 10.6 | 2.1 | 4.99 |
| T4: Sett treatment with Consortium of Endophytic Nitrogen Fixing Bacterial Bioinoculant manually | 19.09 | 16.23 | 13.23 | 2.39 | 4.7 |
| T5: Sett treatment with 0.01% Carbandazim + 0.003% Imidacloprid + Consortium of Endophytic Nitrogen Fixing Bacterial Bioinoculant using vacuum technique | 19.91 | 18 | 12.76 | 2.48 | 4.75 |
| T6: Sett treatment with 0.01% Carbandazim + 0.003% Imidacloprid + Consortium of Endophytic Nitrogen Fixing Bacterial Bioinoculant manually | 19.47 | 17.66 | 12.53 | 2.36 | 5.5 |
| T7: Sett treatment with Ethrel (50 ppm) with vacuum technique | 19.7 | 17.84 | 12.65 | 2.37 | 5.59 |
| T8: Sett treatment with Ethrel (50 ppm) manually | 17.52 | 16.25 | 10.91 | 1.66 | 4.08 |
| T9: Sett treatment with Oligokitosanbiostimulator (100 ppm) with vacuum technique | 20.21 | 18.3 | 12.98 | 2.21 | 5.38 |
| T10: Sett treatment with Oligokitosanbiostimulator (100 ppm) manually | 19.81 | 17.9 | 12.68 | 2.57 | 5.52 |
| T11: Sett treatment with Moist Hot Air at 54°C for 150 min | 18.92 | 16.76 | 11.76 | 2.77 | 6.44 |
| T12: Control- Without sett treatment | 19.89 | 18.07 | 12.84 | 2 | 5.76 |
| Sem ± | 0.51 | 0.61 | 0.49 | - | - |
| C.D. @ 5% | NS | NS | NS | - | - |
| CV% | 4.62 | 6.12 | 6.86 | - | - |

Germination percentage were markedly influenced by sett treatments (Table 1). Sett treated with Ethrel (50 ppm) with vacuum technique recorded 91.26% of germination, followed by (88.49 %) in sett treated with Ethrel (50 ppm) manually at 30 days after sowing. This might be due to a significant increase in germination percentage because of ethrel might lead to increase in ATPase and acid invertase activity. Acid invertase helps in breaking down sucrose into glucose and fructose and ATPase activity yields inorganic phosphorus to provide the cells with energy which helps in improving sprouting. Similar work were reported by Yangrui and Solomon, (2003) and Patel and Chaudhary, 2018).

**Effect on Cane andCCS Yield**

Data expressed in Table 1 showed, significantly higher cane yield (171.17 t/ha) and sett yield (8.66 Lakh two bud setts / ha) was earned in sett treated with Moist Hot Air at 540C for 150

min but in was insignificant with treatment sett treated with 0.01% Carbandazim + 0.003% Imidacloprid + Consortium of Endophytic Nitrogen Fixing Bacterial Bioinoculant using vacuum technique (158.19 t/ha and 7.38 lakh/ha two bud setts). Different sett treatment techniques failed to exert its significant effect on CCS yield .

A significant increase in cane yield in these treatment might be due to setts treated with hot water effectively checks the initial disease entities present on planting material, leads to healthy growth of seedlings, results in getting desired millable cane population which helps for achieving higher cane yield. Also, setts treated with bacterial bioinoculent may get benefitted by beneficial secretions which help for boosting the germination well as they worked with plant system by utilizing their source of energy as sugar from the sugarcane plant and assimilate the nitrogen within the plant, which may be immediately utilized for growth and development of sugarcane plant. The results are in accordance with the results obtained by More, (2012) and Mall *et al*. (2018).

**Effect on Juice quality**

The data on juice quality *viz*. Brix, sucrose and CCS percentage are presented in Table. 2 and it was not affected due to any of sett treatment techniques.

**Economics**

Maximum B:C ratio on weight basis (1:2.77) and (1:6.44) on sett basis (Table 2) was observed under treatment sett treated with Moist Hot Air at 54°C for 150 min. It is a fact that, an increment in cane yield favors higher net gain.

## ACKNOWLEDGEMENT

Authors are thankful to Mr. Sambhaji Kadupatil, Director General, Vasantdada Sugar Institute, Pune for his encouragement during this research work and for giving permission to publish this article. Author is also thankful to the scientists and supporting staff of the crop production division for their help during the field experimentation.

## REFERENCES

**Chen, J.C.P. and Chou, C.C. 1993.** Cane Sugar Handbook: A Manual for Cane Sugar Manufacturer and Chemists. John Willey and Sons, Inc., New York, PP.401-403.

I**dris, M. and Aslam, M. 1975.** The effect of soaking and drying seeds before planting on the germination and growth of Triticum vulgare under normal and saline conditions. *Can. J. Bot*., **53:** 1328-1332.

**Mall A.K., Misra, V., Singh, D., Mukesh Kumar and Pathak, A. D. 2018.** Methods and Procedures for High Yielding Seed Cane Production. International Journal of Agriculture Sciences, ISSN: 0975-3710 and EISSN: 0975-9107, Volume 10, Issue 14, pp: 6660-6664.

**More R. R. 2012.** Sugarcane Research Report of Vasantdada Sugar Institute by Division of Agricultural Sciences and Technology. pp. 354-364.

**Panse, V.N. and Sukhatme, P. V. 1978.** Statistical methods for Agricultural workers. Indian Council of Agricultural Research, New Delhi.P. 347.

**Patel, D. and Chaudhary, M.P. 2018.** Influence of plant growth regulators on growth, yield and quality of sugarcane under south Gujarat. *J. Pharmacognosy and Phytochemistry*. (1):95-97.

**Patel, D. and Patel, R. 2014.** Influence of sett size, seed rate and sett treatment on yield and quality of sugarcane. *The Bioscan*. **9(1):** 55-57.

**Singh, K., Singh, K. and Sanjay kumar. 2013.** Effect of seed rate, seed size and seed treatment on spring planted sugarcane. *J. Sugarcane Research*. **3(1):** 78-82.

**Sundra, B. 1998.** Sugarcane cultivation. Vikas Publishing house Pvt. Ltd, New Delhi, pp. 156-234.

**Vishwanathan, R., Malthi, P., Naik, R., Prasanth, C.N. and Annamalai, S.J.K. 2017.** Sett way of growing sugarcane for fungal treatment. ICAR NEWS. **23(2)**:1-3.

**Yangrui Li and Solomon S. Ethephon**: A versatile growth regulator for sugar cane industry. *Sugar Tech*. 2003; 5:213.