



Co 09004 (AMRITHA): A NEW EARLY MATURING AND HIGH SUGAR VARIETY FOR CULTIVATION IN PENINSULAR ZONE

Co 09004, a high yielding, high quality and early maturing sugarcane variety was developed by ICAR-Sugarcane Breeding Institute, Coimbatore. Based on the superior performance in the zonal varietal trials under All India Coordinated Research Project on Sugarcane {AICRP(S)}, it was identified for release in Peninsular

Zone by the Varietal Identification Committee of AICRP(S) on 20 March, 2017 and later notified by Central Sub-Committee on Crop Standards, Notification and Release of Varieties for Agricultural Crops for cultivation in Peninsular Zone comprising states of Telengana, Karnataka, Maharashtra, Gujarat, Madhya Pradesh, Chhattisgarh, Kerala and parts of Tamil Nadu and Andhra Pradesh. The variety was selected from the segregating progenies of the cross CoC 671 x CoT 8201. While the female parent CoC 671 is a high sugar variety, CoT 8201 is a high cane tonnage male parent and Co 09004 combined both the agronomically important traits.



Fig. 1. Co 09004 – field view

Performance of the variety in Peninsular Zone

The variety was tested in Advanced Varietal Trial of AICRP(S) in two plant and one ratoon crops at 17 centres of peninsular zone during 2014-16. Mean performance of this variety in two plant and one ratoon crops indicated that Co 09004 recorded 109.85 t/ha of cane yield, 14.56 t/ha of Commercial Cane Sugar, 18.94% of juice sucrose and 14.50% of Pol in cane at 10th month (Table 1). It recorded superior performance compared to all the three checks viz., CoC 671, Co 94008 and Co 85004 for all these four important

CONTENTS

A new early maturing and high sugar variety for cultivation in Peninsular Zone	1-2
Agro-inputs validated for treating setts using STD	4-5
Outreach Activities	5
Other Activities	6-7

economic traits. It showed 17.89% and 17.84% improvement over the best standard CoC 671 for sugar and cane yields respectively. This variety was numerically superior to the best standard, CoC 671 for sucrose %. Co 09004 ranked first in 14 out of 17 centres tested compared to all the standards and other test entries for sugar yield (t/ha). For cane yield also, it ranked number one in 11 locations and second in three more locations. Out of 17 locations tested, the entry topped in eight locations and second in five more

locations for juice sucrose %. Co 09004 ranked first in four locations and second in all other three locations for Pol % cane. This indicated that the entry performed well across the zone for both cane yield and juice quality. In addition, Co 09004 has the ideal plant characters of tall canes (250 cm), early fast growth, high tillering, medium thick canes, non-flowering and non-lodging. This variety is an excellent ratooner and recorded 18.60% improvement for cane yield in ratoon crop over the best standard CoC 671.

Table 1. Performance of Co 09004 across 17 locations in Peninsular Zone

Entry / Standard	Cane yield (t/ha)	CCS (t/ha)	Sucrose % in juice	Pol % cane
Co 09004	109.85	14.56	18.94	14.50
Standards				
CoC 671	93.22	12.35	18.90	14.24
Co 94008	93.62	11.31	17.59	12.57
Co 85004	91.98	11.70	18.47	13.58
% improvement over the standards				
CoC 671	17.84	17.89	0.21	1.83
Co 94008	17.34	28.74	7.67	15.35
Co 85004	19.43	24.44	2.54	6.77

Distinguishing Morphological Characters

The variety is characterized with long, medium thick and erect cane. The internodes are long and cylindrical in shape with slightly zigzag arrangement (Table 2). Small oval shaped buds, presence of bud groves and absence of corky patches and ivory marks are the

identification features of this variety. It has excellent field stand, easily detaching, yellowish pink canes with less wax on canes.

Co 09004 is moderately resistant to red rot and resistant to smut, major diseases in different states of Peninsular Zone. This variety is less susceptible to top borer in all the locations tested. It was less susceptible to moderately susceptible for early shoot borer, internode borer and scale insect. This variety is tolerant to drought and salinity conditions, the major yield limiting abiotic stresses in Peninsular Zone. It possesses A₁ quality jaggery of golden yellow colour. Co 09004 is recommended to improve sugarcane and sugar productivity under normal production condition and also in red rot and smut prone regions of Peninsular Zone.

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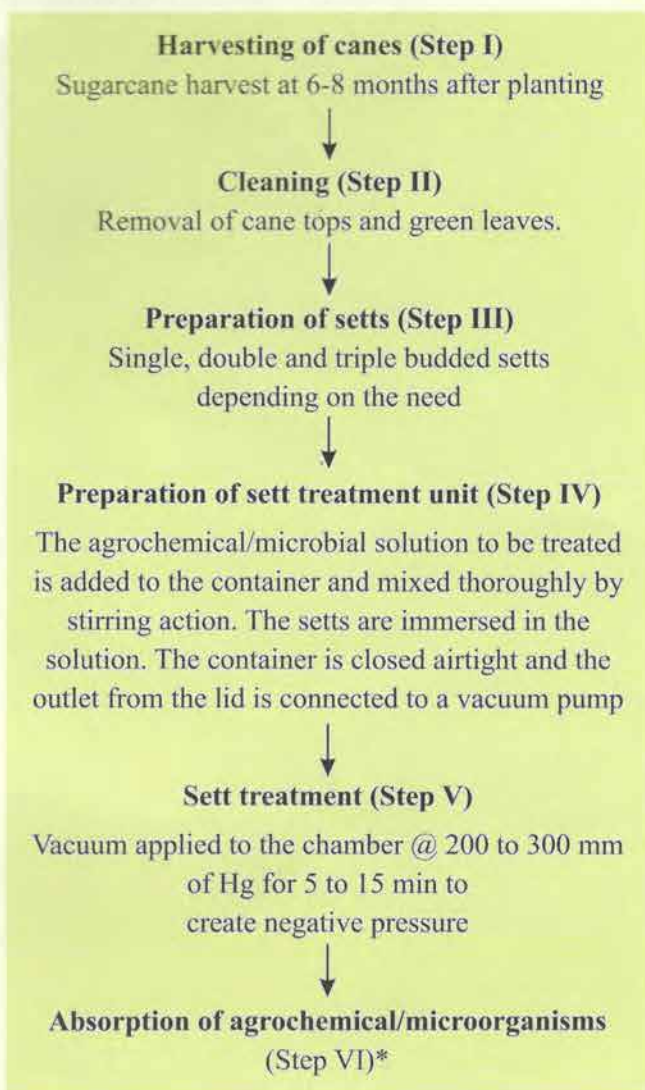
Table 2. Distinguishing morphological characters of the variety Co 09004

S.No	Descriptor	Details
1	Parentage	CoC 671 x CoT 8201
2	Stool growth habit	Semi erect
3	Stem colour (Exposed to sun)	Yellowish pink
4	Stem colour (unexposed)	Light pink
5	Ivory marks	Absent
6	Corky patches	Absent
7	Internode shape	Cylindrical & Conoidal
8	Internode alignment	Slightly zigzag
9	Internode diameter	2.5 cm
10	Internode pithiness	Light
11	Growth cracks	Absent
12	Internode waxiness	Light
13	Node swelling	Absent
14	Root zone colour (exposed)	Light yellowish green
15	Root zone colour (unexposed)	Yellow
16	No. Root eyes	Two
17	Arrangement of root primordia	Irregular
18	Bud size	Small, slightly projecting
19	Shape of bud (Artswager)	Oval
20	Bud cushion	Absent
21	Bud groove	Present
22	Growth ring colour	Yellowish orange
23	Leaf length	1.1m
24	Leaf width	5.0 cm
25	Lamina colour	Light green
26	Leaf carriage	Fan shaped
27	Leaf sheath colour	Yellowish green
28	Leaf sheath waxiness	Absent
29	Leaf sheath spines	Light
30	Leaf sheath clasping	Very light
31	Colour of dewlap	Brown
32	Shape of auricle	Short lanceolate
33	Shape of ligule	Crescent with lozenge

PACKAGE FOR SETT TREATMENT DEVICE TO TREAT SETTS/ BUD CHIPS

Mechanized means of sett treatment through sett treatment device (STD) is a practically feasible way to treat sugarcane planting material (single/ two/ three budded setts/ bud chips) with agrochemicals or microbes for nursery and main field application. This novel technique has principle of creating negative pressure followed by absorption of chemicals inside the setts. This method of sett treatment is performed with the prescribed pressure and duration (15-30 min) under field conditions. This method of sett treatment is an improved method over conventional sett soaking as it has certain advantages such as rapidity, economical and repeated use, less cumbersome in handling material, capable of delivering more than one agrochemical at a time and suitability for large scale application under farmer's field condition.

Flow Chart for mechanical treatment of sugarcane planting materials (Fig. 2a & 2b.)



*Vacuum, treatment time and air release would vary depending on the size of the unit and inputs used. These parameters have to be optimized accordingly.

Air released slowly for 5 to 15 min and that makes setts to absorb and diffuse the agrochemical/ microorganism present in the container.



Fig. 2a. Sett Treatment Device (STD) containing single bud setts soaked in treatment solution



2b. Preparation of single bud setts

Agro-inputs validated for treating setts using STD

For Nursery (Fig. 3a & 3b)

Nutrient mixture alone

Concentration: Urea - 1g/ lit + $ZnSO_4$ - 1g/ lit + $FeSO_4$ - 1g/ lit (Commercial formulations of the chemicals [0.05% to 0.1% each] either solid or liquid, they have to be standardized. Impact of the chemicals/ dosage on sett germination and settling growth are to be optimized before hand). Vacuum level: 250Hg/mm; Duration: Vacuum retention-15minutes; Slow release: 5-10 minutes.

Nutrient mixture + Pesticides

Concentration: Nutrient mixture + Carbendazim - 0.1% or Propiconazole - 100 ppm + Fipronil -50 ppm; Vacuum level: 200Hg/mm; Duration: Vacuum retention - 15 minutes; Slow release: 5-10 minutes.



Fig. 3a. Production of healthy settlings by treating single bud setts with fungicide, insecticide and nutrients



Fig. 3b. Good crop stand of Co 86032 in the field raised from settlings of treated setts

For main field

Fungicides for disease management (Fig. 4)

Red rot: Thiophanate methyl - 0.1% ; Smut: Propiconazole - 100 ppm; Vacuum level: 300 Hg/mm; Duration: Vacuum retention - 15 minutes; Slow release: 10-15 minutes

The above fungicides can be utilized to prevent disease development in the field through micro-irrigation (drip) or soil drenching against red rot and spraying against smut. Secondary application along with sett treatment with systemic fungicides was found more effective



Fig. 4. Disease management with fungicide treatment against the diseases compared to sett treatment alone. Like fungicides, insecticide Fipronil -50 ppm can also be given as sett treatment for early shoot borer management.

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OUTREACH ACTIVITIES

STATE LEVEL TRAINING PROGRAMME

A state level training program was organized for 18 senior cane officials from Uttar Pradesh during 17-22 April 2017 (Fig.5-8). The training was sponsored by Lal Bahadur Shastri Ganna Kisan Sansthan, Lucknow.



Fig. 5. Participants of the State level training

As a part of the training, visits were made to Indian Institute of Soil and Water Conservation Research Centre, Udhagamandalam, Central Marine Fisheries Research Institute Research Centre, Mandapam and Agricultural College & Research Institute, Madurai.



Fig. 6. Dr. Bakshi Ram, Director, ICAR-SBI interacting with the participants



Fig. 7. Participants at Central Marine Fisheries Research Institute- Regional Centre, Mandapam



Fig. 8. Participants visiting a sensor based irrigation demonstration plot

EXPOSURE VISIT

A one-day exposure visit was conducted for 78 students of class 11 from Sethubhaskara Higher Secondary School, Chennai on 30 May 2017 (Fig. 9).



Fig.9. Students being explained in the institute museum

VISITORS PROGRAMME

We had entertained 411 visitors during the period including students (293), farmers (97) cane development officers and university staff (21). They were shown the institute museum, technology park and the laboratories.

OTHER ACTIVITIES

EDUCATION

M.Sc. (Sugarcane technology) course is being offered by the institute jointly with Tamil Nadu Agricultural University, Coimbatore in open and distance learning mode. The personal contact classes for 18 IV semester students were conducted during 3-7 May 2017 and the personal contact classes for 26 II semester students of M.Sc. (Sugarcane technology) course were conducted during 11-20 June 2017.

INTERACTIVE MEET

D. Bakshi Ram, Director, ICAR-SBI had an interactive meeting with the students who are undergoing internship training / summer training at the institute on 27 May 2017 (Fig. 10).



Fig. 10. D. Bakshi Ram, Director, ICAR-SBI interacting with student trainees on 27 May 2017

INSTITUTE RESEARCH COUNCIL MEETING

The Institute Research Council meeting was conducted during 12-17 June 2017. The progress of the ongoing research projects was reviewed. Eighteen sub-projects were concluded and eleven new projects were approved for the coming year.

INTERNATIONAL YOGA DAY

International Yoga Day was celebrated at the Institute on 21 June 2017. Shri. S. Jeladharan Nair, Yoga Expert, Coimbatore was the Chief Guest and he gave a lecture on 'Yoga for Positive Health' followed by demonstration on yoga postures. (Fig. 11).



Fig. 11. Demonstration of Yoga postures

SCIENTIFIC PARTICIPATION

- Dr. Bakshi Ram, Director, ICAR-SBI attended the National Conference on 'Sustainable Development Goals: Preparedness and role of Indian Agriculture' on 11 May 2017 at New Delhi.
- Dr. Bakshi Ram, Director, ICAR-SBI attended the Second Annual Convention of NISSTA held at ICAR-IISR, Lucknow during 12 -13 May 2017 as Guest of Honour and presented an invited paper.

MEETINGS

- Senior Officers Committee meeting held on 03 April 2017, 04 May 2017 and 17 June 2017.
- IJSC meeting held on 03 April 2017.
- Grievance Committee meeting held on 13 April 2017, 11 May 2017 and 09 June 2017.
- Women Cell meeting held on 04 May 2017.
- Selection Committee meeting for the post of Senior Research Fellow held on 15 May 2017.
- Farm Advisory Committee meeting held on 3 April 2017, 4 May 2017 and 9 June 2017

APPOINTMENTS

- Smt S. Rama, Senior Administrative Officer assumed charge w.e.f. 03 April 2017 on her transfer from ICAR-NBAIR, Bengaluru.
- Dr. L. Saravanan, Scientist (Entomology) joined at this Institute on 02 June 2017 on his transfer from ICAR-IIOPR, Pedavegi.
- Dr B. Mahendran, Scientist (Entomology) joined at this Institute on 07 June 2017 on his transfer from CHES, IIHR, Chettalli.
- Dr K. Devakumar, Senior Scientist (Biotechnology) joined at this Institute on 21 June 2017 on his transfer from ICAR-CPCRI, Kasaragod.
- Shri N. Selvaraj, TSL appointed as Skilled Support Staff w.e.f. 22 May 2017.

TRANSFER

- Dr. Lovejot Kaur, Scientist transferred to ICAR-CIPHET, Ludhiana w.e.f. 07 June 2017.

RETIREMENT

- Dr. R. Jayanthi, Principal Scientist (Entomology) retired from service on superannuation on 30 April 2017.
- Shri. Balwan Singh, Assistant Administrative Officer retired from service on superannuation on 30 April 2017.

- Shri P. Manohar, Assistant Chief Technical Officer retired from service on superannuation on 30 April 2017.
- Shri P. Periaswamy, Technical Officer retired from service on superannuation on 30 April 2017.
- Shri R. Palaniswamy, Senior Technician retired from service on superannuation on 31 May 2017.
- Smt V. Rajalakshmi, Skilled Support Staff retired from service on superannuation on 31 May 2017.

AWARDS AND RECOGNITIONS

A district level function was organized by Shri D.K. Singh, District Magistrate, Muzaffarnagar on 28 April 2017 for felicitating Dr. Bakshi Ram, Director, ICAR-SBI for his contributions in improving farmers' income and sugar recovery through the variety Co 0238. Dr. Sanjeev Baliyan Ji, Honourable Minister of State for Water resources and Rivers Development honoured Dr. Bakshi Ram. Others present were Shri. Naresh Tikait, (President BKU), Shri Kapil Dev Agarwal (MLA), Shri. Umesh Malik (MLA), Shri. Vijay Kashyap (MLA), Shri. Bablu Kumar (SSP), Dy CC, DCO, sugar factories personnel and farmers (Fig. 12).



Fig. 12 . Dr. Bakshi Ram being honoured by Dr. Sanjeev Balyan, MoS, Water Resources, River Development & Ganga Rejuvenation

VISITORS

Five Australian Scientists visited ICAR- Sugarcane Breeding Institute for attending Collaborative Workshop between ICAR-SBI and Sugar Research Australia held during 17-18 April 2017.

An Indonesian delegation headed by H.E. Mr. Longki Djanggola, Governor of Central Sulawesi Province of the Republic of Indonesia visited on 07 April 2017 to know the sugarcane production technology being adopted in the Institute.

PUBLICATIONS FOR SALE

S.No.	Details of the book	Year	*Price in Rs.
1	Handbook on Sugarcane - Edited by Bakshi Ram et al., 264 pp.	2016	130.00
2	Karumbu Sakubadi (Tamil) - Edited T. Rajula Shanthy et al., 162 pp.	2016	130.00
3	Sugarcane Technologies - By T. Rajula Shanthy et al., 116 pp.	2016	220.00
4	Insecticides: An Advisory - By T. Ramasubramanian and J. Srikanth 21pp.	2015	40.00
5	An inventory of farmers' practices for inclusive development in sugarcane production system - By C. Karpagam et al., 132 pp.	2014	390.00
6	Improving Sugarcane Productivity - Edited by Puthira Prathap and N. Vijayan Nair	2013	320.00
7	Perspectives in sugarcane agriculture - Edited by N.V.Nair et al	2012	350.00
8	Sugarcane diseases and their management - By R. Viswanathan	2012	250.00
9	Sugarcane pests and their management - By J. Srikanth, K.P. Salin and R. Jayanthi	2012	200.00
10	Sugarcane Varieties in India (1979-86): Morphological descriptions and agricultural characteristics - By P. Sankaranarayanan and B.V. Natarajan, 239 pp.	1987	145.00
11	Catalogue on Sugarcane Genetic Resources - I (<i>Saccharum spontaneum</i>) - By P. Kandasami et al.	1983	75.00

DVDs FOR SALE

S.No.	Title of the video film	Year	*Price in Rs.
1.	New Sugarcane Varieties	2016	100
2.	Seed Production in Sugarcane	2016	100
3.	Integrated Nutrient Management in Sugarcane	2016	100
4.	Integrated Pest Management in Sugarcane	2016	100
5.	Integrated Disease Management in Sugarcane	2016	100
6.	Ratoon Management in Sugarcane	2016	100

ICAR-SBI
Quarterly
Newsletter

Published by : Dr. Bakshi Ram, Director, ICAR-SBI, Coimbatore
 Editors : Dr. T. Rajula Shanthy and Dr. Bakshi Ram
 Phone : 0422 - 2472621, Fax : 0422 - 2472923
 E-mail : director@sugarcane.res.in
 Website : <http://sugarcane.icar.gov.in>

This Newsletter is
 available at
<http://sugarcane.icar.gov.in/news>
 July 2017.pdf
 ISSN : 0973-8170
 Printed at
 Shri Garuda Graphics, Coimbatore