

ICAR - NATIONAL RESEARCH CENTRE FOR GRAPES *at a glance*



ICAR-NATIONAL RESEARCH CENTRE FOR GRAPES
(An ISO 2001: 2008 certified organisation)
Manjri, Pune - 412 307 (MS), India





Published by:

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ICAR-National Research Centre for Grapes, Pune



Quality Management System Certificate

GERMAN CERT

ICAR-NATIONAL RESEARCH CENTRE FOR GRAPES [NRCG]

located at
P.B. No. 3, P.O. Manjri Farm, Solapur Road, Pune - 412307, Maharashtra, India

German Cert Co., Ltd. hereby certifies that the quality management system of the above organization has been evaluated and found to be in line with the requirements of the following standard:

ISO 9001:2008

for the scope of

Provision of Research & Services for Production & Utilization of Grapes and its Processed Products

Certificate Number: GCQ-161406

This certificate is valid from February 29, 2016 until February 28, 2019.

Initial certification date: February 29, 2016

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Certification valid until: February 28, 2019

Daek Wooki

Scheme Manager



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QUALITY MANAGEMENT SYSTEM

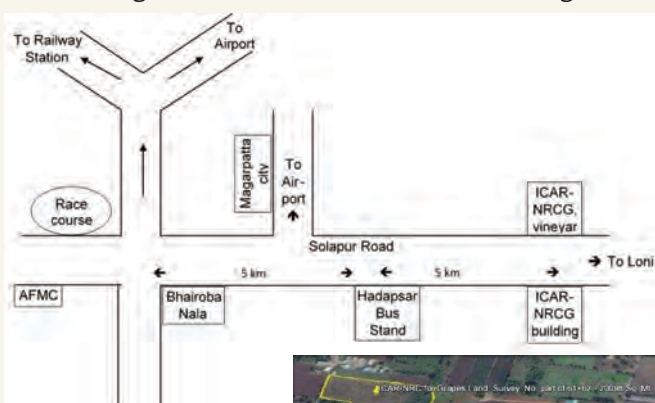
1 THE ORGANIZATION

ICAR-National Research Centre for Grapes was established on 18th January 1997 to carry out mission oriented research programmes for resolving the problems in the production and utilization of grapes in India. It is a part of the National Agricultural Research and Education System under the aegis of Indian Council of Agricultural Research, New Delhi. It is also the nodal Centre for co-ordinating grape research in India under AICRP-fruits. Apart from in-house research, the Centre collaborates with other research institutes, universities, government departments, public and private organizations, and the grape industry for research, technology transfer, training and skill development.

In the two decades of its existence, the Centre has developed research infrastructure and expertise *at par* with international laboratories. Its strong research and technological support has made the Indian grape industry world competitive.

2 LOCATION

The Centre is located at Manjri, Pune on Pune-Hyderabad National Highway No. 65, commonly known as Solapur Road at coordinates 18° 29' 570" N and 73° 59' 168" E and 559 m above mean sea level. It can be easily reached by road or air. It is located at a distance of 5 km from Hadapsar bus stand, 15 km from Pune railway station, 16 km from Swargate bus stand and 21 km from Lohegaon airport.

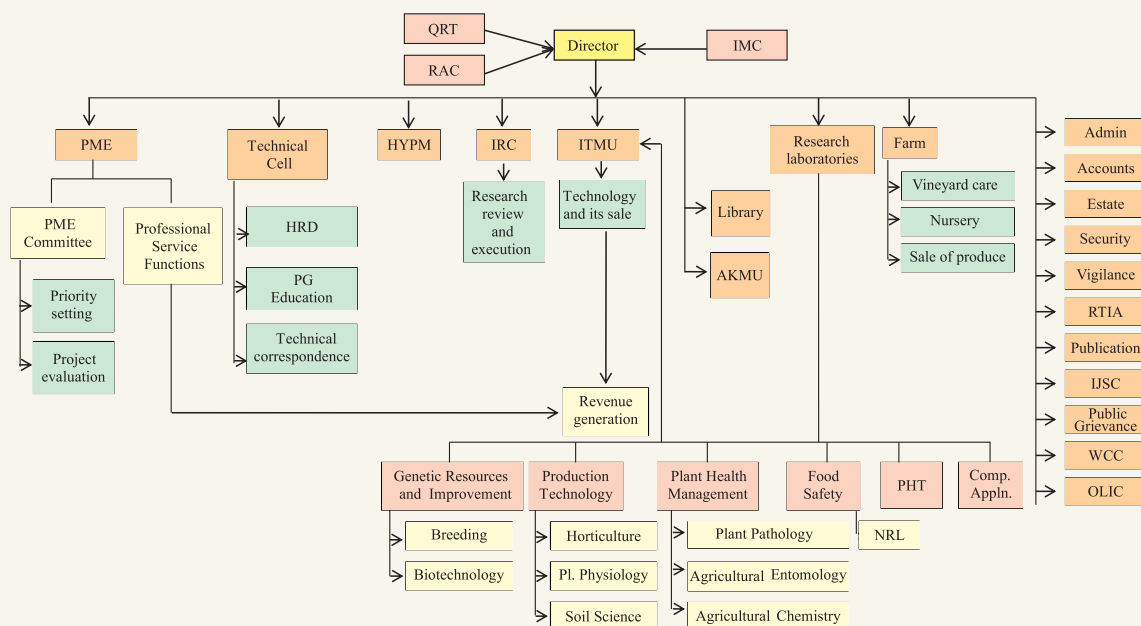


3 MANDATE

As per the DARE order F.N. 13(102)/2015-cdn. Tech. dated 20th May 2016, the following is the Centre's mandate.

- Strategic and applied research on safe grape production and productivity.
- Transfer of technology and capacity building of stakeholders for enhanced and sustained production of grapes.
- National Referral Laboratory for Food Safety and Pesticide residue in fruits.

4 ORGANIZATIONAL SETUP



AKMU: Agriculture Knowledge Management Unit; HRD: Human Resource Development; HYPM: Half Yearly Performance Monitoring; IJSC: Institute Joint Staff Council; IMC: Institute Management Committee; IRC: Institute Research Council; ITMU: Institute Technology Management Unit; NRL: National Referral Laboratory; OLIC: Official Language Implementation Committee; PHT: Post Harvest Technology; PME: Priority setting, Monitoring and Evaluation; QRT: Quinquennial Review Team; RAC: Research Advisory Committee; RTI: Right to Information; WCC: Women Complaint Committee

The Centre has sanctioned staff strength of 45, comprising of Director, 16 scientific, 8 technical, 13 administrative and 7 supporting posts.

6.1 Buildings

The Centre is established on 46.78 ha land. The Centre functions from Dr. G.S. Cheema Bhavan, the laboratory-cum-administrative building. It has Director's office, Administrative-cum-Accounts office, Library, committee room, Seminar Hall, Museum, PME Cell and research laboratories for different disciplines. Separate buildings for Biotechnology, National Referral Laboratory and Biocontrol research have been constructed. Apart from these, structures for insect rearing, farm office, raisin shed with different temperature and humidity levels, FRP houses, glass house and net house are constructed. A fermentation room with 30 fermenters of 25 l capacity is set up for enological research. Besides this, a few residential quarters are available.



Research winery

6.2 Experimental vineyards

Vineyards for maintaining germplasm, and for various experiments on evaluation of varieties, rootstocks, bio-regulator scheduling, optimizing irrigation and nutrient requirements, evaluation of plant protection measures, DUS testing and AICRP trials are established. These vineyards are spread over an area of about 26 ha. All the vineyards are irrigated by automated irrigation system. Lift irrigation system ensures availability of irrigation water for the drip system. Several of the vineyard operations are mechanised to improve the labour efficiency and to complete farm operations on time. Tractors fitted with electrostatic sprays of latest configuration ensure uniform and efficient spray of agri-inputs. All the vineyard waste is recycled by composting.



Cane shredder



Tractor fitted with electrostatic spray system

6.3 Nursery

A nursery to produce and supply quality planting material to grape growers and other recognised nurseries is established over an area of 4 acres. The nursery is consisted of mother block, where genetically pure and disease free mother vines of rootstocks and scion varieties are maintained and used for multiplication of planting material. The supplied material is regularly tested for its genuineness and quality.



Nursery

6.4 National Active Germplasm Site

One of the major responsibilities of the Centre is to consolidate indigenous and exotic grape germplasm available in India. The Centre is also importing required germplasm to widen its genetic base required for crop improvement. At present 415 accessions comprising 110 indigenous, 305 exotic, 22 rootstocks, 8 related species are maintained in the germplasm. Pollens of 287 of these accessions have been cryopreserved.



Germplasm variability

6.5 Laboratory and Administrative Facilities

The Centre has latest generation models of HPLC and ICP-MS, automated sequencer (genetic analyzer), atomic absorption spectrophotometer, multi-channel auto analyzer, infrared gas analyzer, canopy analyzer, osmometer,



Real-time PCR machine and liquid handling system



Library

steady state porometer, pressure bomb apparatus, plant growth chambers, compound and stereo-microscopes with image analysis systems, real time PCR machine, liquid handling system, fermenters etc. apart from other essential equipments.

The library subscribes to all foreign journals related to viticulture, besides access to large number of journals through CeRA

(Consortium for e-Resources in Agriculture). It also has a good collection of books on viticulture, general horticulture and other disciplines. A large collection of Hindi books on science, literature and general subjects is also available.

Latest configuration computers with LAN and Internet facilities are made available to all the staff to implement MIS-ERP and for data storage and analysis. Statistical software 'SAS' is available to all scientific and technical staff for research data analysis.

The Center's website, <http://nrcgrapes.nic.in> is maintained in Hindi and English languages and provides useful technical and administrative information for farmers and general public. It is updated at weekly intervals.

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NATIONAL REFERRAL LABORATORY

National Referral Laboratory (NRL) was established during 2003-04 in premises of ICAR-NRCG, for successful implementation of Residue Monitoring Plan (RMP) by the scientists of the Centre under the leadership of then Director Dr P.G. Adsule on the initiative and financial support of APEDA. Today NRL is a NABL accredited laboratory and is equipped with several state of the art instruments like LC-MS/MS-TOF, HRLC-MS/MS, ICP-MS etc. This laboratory has significantly contributed in successful implementation of RMP for export of table grapes to EU countries. The laboratory is credited for establishing comprehensive residue analysis protocols for the simultaneous analysis of more than 400 agrochemicals with high precision, accuracy and sensitivities at ≤ 10 ng/g comparable to any internationally acclaimed laboratory. Technology for the analysis of agrochemical residues is constantly



LC-MS/MS with atmospheric pressure GC



Orbitrap -LC-MS

upgraded and transferred to technicians of participating private laboratories through well-organized training programs.

In recent years, most grape growers are dependent on Annexure 5 (list of agrochemicals permitted to use in grape) of RMP document for the production of quality grapes. Information on bio-efficacy and PHI of listed agrochemicals is based on studies conducted at the Centre. The list is updated regularly when new information is available. Plant pathologists and

Entomologists of the Centre discuss strategies on disease and insect pest management in charchasatra's organized by the grape growers' associations every

year before fruit pruning. These charchasatra are conducted in all major grape growing areas and attended by a large number of grape growers with interest. Impact of all these activities has resulted in considerable awareness among growers regarding appropriate usage of agrochemicals. The outcome of such awareness is reflected in sharp decline in failure of samples analysed for residues. In 2003-04, the first year of RMP, 23.69% samples failed to comply with EU-MRL, this has now reduced to 11-12% during last five years.

For the traceability details of residue analysis of each sample, networking software called “Grapenet” was prepared by APEDA. The scientists of the Centre involved in NRL activities significantly contributed in the development of Grapenet. The system has received national award for 'e-governance'. Dr Kaushik Banerjee who is incharge of NRL since 2005 has been declared winner of Harvey W. Willey award of AOAC international for the year 2017, which is the highest award of AOAC. He is the first Indian to receive this award.

8 RESEARCH ACHIEVEMENTS / TECHNOLOGIES DEVELOPED

The research during last 19 years has resulted in the development of several technologies and/or research findings which has benefitted the grape growers and other stake holders. Some of these technologies are highlighted below.

Varieties



Manjari Naveen, a clonal selection was released as table grape variety



Medika, a new hybrid was found promising for juice and related processing industry



A18/3, a new promising hybrid black table grape variety

Growth stage-wise irrigation schedule

Irrigation schedule based upon growth stage and pan evaporation has been developed for different varieties. The irrigation schedule for Thompson Seedless vines raised on Dogridge rootstock which led to 52% savings of irrigation water is given below.

Growth Stage	Expected duration (days after pruning)	Water requirement (l/day/ha per mm of evaporation)	Expected monthly Pan evaporation (mm) in different grape growing regions
Foundation pruning season			
Shoot growth	1-40	4200	8-12
Fruit bud differentiation	41-60	1400	8-10
Cane maturity and fruit bud development*	61-120	1400	0-6
121days - fruit pruning *	121 -	1400	0-6
Fruit pruning season			
Shoot growth	1-40	4200	6-8
Bloom to shatter	41-55	1400	4-6
Berry growth and development	56-105	4200	3-6
Ripening to harvest	106- harvest	4200	8-10
Rest period	Harvest to foundation pruning	-	8-10

Technologies to minimize the impact of moisture stress to grapevines



Sub surface irrigation – saves 25% water



Use of mulch in combination with anti-transpirant – 25% saving

Petiole nutrient guide

The petiole nutrient content tells us about the vineyard health. It indicates whether the nutrients in the vines are at optimum or deficient or toxic level. Application of fertilizers is recommended based on these levels. Optimum range of petiole nutrient contents for Thompson Seedless vines grafted on Dogridge rootstock is given below.

Nutrient	Bud differentiation stage	Full bloom stage
N (%)	1.20 – 1.53	1.44 – 1.80
P (%)	0.387 – 0.472	0.283 – 0.356
K (%)	0.590 – 0.680*	1.61 – 2.95
Ca (%)	0.727 – 1.03	0.508 – 0.81
Mg (%)	0.877 – 1.28	0.579 – 0.870

Fertigation schedule

The fertigation schedule developed for Thompson Seedless led to 60 % saving over direct soil application. Fertigation schedule for various growth stages of Thompson Seedless vines raised on Dogridge rootstock using saline irrigation water (EC = 1.7-18 dS/m) is as follows.

Growth stages	Expected duration (Days after pruning)	Nutrient application (kg/ha)		
		N	P ₂ O ₅	K ₂ O
Foundation pruning				
Shoot growth	1-30	60	-	-
Shoot growth	31-40	20	35.5	-
Fruit bud differentiation	41-60	-	71	-
Cane maturity and Fruit bud development*	61-120	-	-	80
121 days - fruit pruning*	121-	-	-	-
Fruit pruning				
Shoot growth	1-40	80	-	-
Bloom to Shatter	41-55	-	26.5	-
Berry growth and development	56-70	-	26.5	-
Berry growth and development	71-105	80	-	80
Ripening to Harvest	106- harvest	-	-	80
Rest period	Harvest to foundation pruning (20 days)	26	18	26

Association of nutrients with disorders

Based on the laboratory analysis association of several disorders with nutrients was established and their remedial methods were suggested to the growers.



Iron deficiency



Red vein necrosis –
K deficiency



Leaf curling –
K deficiency



Leaf blackening – Na toxicity
and K deficiency



Bunch stem necrosis
Imbalance of Ca:Mg:K

Use of Rootstock

Dogridge is found to improve the yield and quality of major commercial varieties especially for bold berries. However, 110R is more suitable for conditions where soil and irrigation water have high sodium content.



110R rootstock



Dogridge rootstock

Online advisory

The Centre has developed system for generation of weather information based location specific advisory for management of important diseases, downy mildew and powdery mildew. System takes recorded weather data and forecasted weather data of specific location as input and estimates risk of the diseases for next one week. In interactive website, grower reports action taken during past few days to get the advice.

Advisory is provided on android App by the service provider SK Crop Tech who is under licence agreement with NRCG for Maharashtra state. More than 7000 subscribers are using the advisory system.



Weather station

Value added products

Using winery by-products



Cookies enriched with pomace



Ice cream enriched with wine lees

Using grapes of new hybrid Medika



Spray dried anthocyanin from Medika in powder and capsule form

Molecular characterization of grape germplasm

Microsatellite based characterization of grape germplasm lead to identification of several duplicates, misnomers and synonyms in the collection. Genetic identity of major wine varieties was ascertained. Molecular analysis was used to resolve the identity of rootstocks Dogridge A and Dogridge B. Dogridge B was identified as the true Dogridge (*Vitis champinii*), whereas Dogridge A was identified as a hybrid of *Vitis berlandieri* x *V. rupestris*. Now Dogridge B is known as Dogridge and Dogride A as rootstock B2/56.

Biocontrol of diseases and pests

Promising microorganisms, parasites and predators for disease and / or insect pest management have been identified and are under field evaluation. These bio-control agents have also shown potential for management of fungicide resistant isolates of pathogens and for biodegradation of pesticide residues on berries.



Predatory beetle *Scymnus coccivora* Ayyar feeding on Mealybug colony

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AWARDS AND RECOGNITION

- The Centre is the recipient of APEDA export award 2005, recognizing its contribution towards efficient implementation of the pesticide residue monitoring plan and research on grapes thereby facilitating the export of grapes.
- The Centre's Annual Report was selected for ICAR Best Annual Report award 2011-12 under small institute category.



- The research conducted at the Centre has won many awards during presentations in different national and international symposia.
- The scientists are recognized guides for PG research and so far 5 students have completed their Ph.D and another 30 students are registered with different universities.

- Many Scientists are the Fellows of National professional societies in the fields.
- Scientists are also awarded by professional societies and grape growers associations.
- The scientists are publishing their research in high impact journals. So far 258 research papers have been published in reputed journals.
- The expertise and caliber of the scientists is recognized by different funding agencies which are funding several research projects of the Centre.



10 ONGOING RESEARCH & DEVELOPMENT PROGRAMMES

10.1 RESEARCH PROGRAMMES

1. Conservation, characterization and utilization of grape.
2. Genetic improvement of grape.
3. Development and refinement of production technologies for enhancing quality, productivity and sustainability in grape.
4. Development and refinement of integrated protection technologies in grape.
5. Development of pre-& post-harvest technologies for processing of grapes and value addition.
6. Food safety in grapes and its processed products.
7. Improving knowledge and skill of stakeholders for increasing area, production and quality of grapes and sustaining its productivity.
8. Flagship Programme: Decision support system for viticultural operations.

10.2 DEVELOPMENT PROGRAMMES

1. North Eastern Hills : in Champhai, Mizoram
2. Tribal Sub Plan : in Champhai, Mizoram
3. Mera Gaon Mera Gaurav : - in Walva, Sangli, Maharashtra



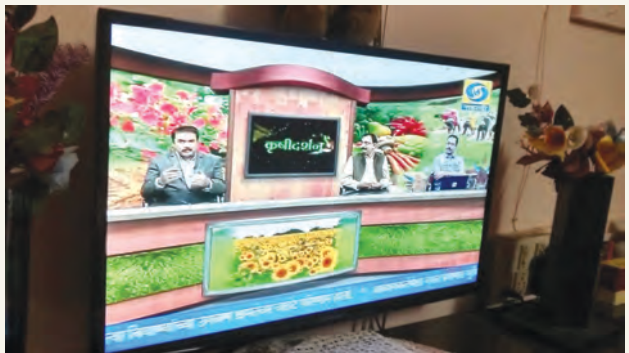
Development Programme in Champhai

Name and discipline	Working at ICAR-NRCG since
Dr. S.D. Sawant, (Plant Pathology) Joined as Director since June 2013	12.12.1996
Dr. Indu S Sawant, Principal Scientist (Plant Pathology)	12.12.1996
Dr. R.G. Somkuwar, Principal Scientist (Horticulture)	18.12.1996
Dr. Anuradha Upadhyay, Principal Scientist (Biotechnology)	22.10.2001
Dr. A. K. Upadhyay, Principal Scientist (Soil Science)	16.10.2002
Dr. Kaushik Banerjee, Principal Scientist (Agricultural Chemistry)	07.02.1997
Dr. S. D. Ramteke, Principal Scientist (Plant Physiology)	16.12.1996
Dr. A.K. Sharma, Principal Scientist (Horticulture)	13.04.2007
Dr. Sujoy Saha, Principal Scientist (Plant Pathology)	20.05.2015
Mrs. Kavita Mundankar, Scientist Senior Scale (Computer Application)	6.12.1999
Dr. D.S. Yadav, Scientist (Entomology)	19.6.2009
Dr. Roshni Samarth, Scientist (Plant Breeding)	23.4.2010
Dr. Ahammed Shabeer T.P., Scientist (Agricultural Chemistry)	16.04.2012
Dr. Babasaheb B. Fand, Scientist (Entomology)	13.05.2016
Dr. Dhananjay N. Gawande, Scientist (Plant Breeding)	25.7.2016
Ms. Anupa T., Scientist (Fruit Science)	01.01.2014
Ms. Sharmistha Naik, Scientist (Fruit Science)	01.04.2015

The Centre participates in 'charchasatra' organised by State Grape Growers Associations, in different grape growing regions before foundation and fruit pruning to educate the farmers about practices to be followed in their vineyards for obtaining good crop. Each charchasatra is attended by a few thousand growers.



Besides these charchasatra, farmers are educated through radio talk, TV programs and articles in agri-newspaper Agrowon. Weekly advisory by the scientists of this Centre published in newspaper Agrowon is religiously followed by the most grape growers. Common grape growers are very demanding for latest information on grape production



technology. Before using new pesticide or other agrochemical available in the market growers demand bio-efficacy studies conducted at NRCG.

NRCG also conducts on farm research trials cum demonstrations to fine tune the technologies developed by

them. During 2015-16, Centre's scientists conducted trial on growers' vineyard to demonstrate subsurface irrigation for improving water use efficiency in drought prone area. About 40% saving of water as compared to farmers practice was demonstrated.



13 RESEARCH LINKAGES

The Centre is collaborating with other Research Institutes; Universities, other organizations and agencies. These are,

- ICAR institutes like, IARI, New Delhi; IASRI, New Delhi; IIHR, Bangalore; IISR, Kozhikode; NBAIM, Mau; CMFRI, cochin
- CSIR-NCL, Pune; ARI, Pune; BARC, Mumbai
- DAC, New Delhi; APEDA, New Delhi; DBT, New Delhi
- Panjab University, Chandigarh
- Spices board, Cochin
- Maharashtra and Karnataka States Grape Growers' Associations

14 MoU with Universities for P.G. research

- Savitribai Phule Pune University, Pune
- Shivaji University, Kolhapur, Maharashtra
- University of Horticultural Sciences, Bagalkot, Karnataka
- Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad
- Indira Gandhi Krishi Vishwavidyalaya, Raipur

15.1 Training/Consultancy

1. Improved viticultural techniques for production of quality grapes
2. Integrated nutrient and water management
3. Disease and insect pest management in vineyards
4. Postharvest technologies for value addition
5. Custom made packages as per demand

15.2 Contract / sponsored research trials

1. Bio-efficacy of agrochemicals and agri-inputs
2. Bio-efficacy of bio-pesticides and bio-fertilizers
3. Residue analysis of agrochemicals

15.3 Supply of planting material

The planting material of rootstocks Dogridge and 110R is available in bulk during January to March. The bookings for the same can be made during June-July. Other rootstocks like 1103P, Salt Creek, St. George, 99R, 1613C are also made available in small numbers on demand. Booking for scion varieties Thompson Seedless, TAS-A-Ganesh, Fantasy Seedless, Red Globe, Manjari Naveen, KR White and Medika can be made during June - July and cuttings are made available during August –September.

For further information contact

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