

ICAR-DARE steered successfully

G20 Meeting of Agricultural Chief Scientists (MACS)

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The G20 works to address major global issues related to food security, nutrition, economy, financial stability, climate change adaptation and mitigation, and sustainable development. The Meeting of Agricultural Chief Scientists (MACS) in G20 is a scientific track of information exchange on the issues of utmost relevance and crucial needs for joint action in the future. The MACS 2023 has been steered by DARE-ICAR and was held with the theme of 'Sustainable Agriculture and Food Systems for Healthy People and Planet'. The discussions on issues of relevance for food security especially in the context of International Year of Millets, resilience to crisis through climate resilient agriculture and One Health approach, emerging issues e.g. digital agriculture and public-private partnerships for R&D were held. The meeting specifically featured Millets and Other Ancient Grains International Research Initiative (MAHARISHI) and was accepted by all member countries with emphasis on millets based local food system for agrobiodiversity, food and nutrition security.

Keywords: Climate resilient agriculture, Food security, G20, MACS, One Health approach

THE G20 is the intergovernmental forum comprising of 19 countries (Argentina, Australia, Brazil, Canada, China, France, Germany, India, Indonesia, Italy, Japan, Republic of Korea, Mexico, Russia, Saudi Arabia, South Africa, Türkiye, United Kingdom and United States) and European Union. All major developed and developing economies of the World are members of this group which works to address major global issues related to food security, nutrition, economy, financial stability, climate change adaptation and mitigation, and sustainable development. The member countries of G20 together accounts for about 80% of World's GDP, 3/4 of trade, 2/3 of population and close to 60% of global land use. G20 was founded in 1999 in response of many global crises. The heads of state meet annually at its summit since 2008. Several of other countries, international organizations and non-governmental organizations are also invited, some on a permanent basis, in G20 summit and other meetings. G20 summit 2009, held in London declared itself the premium forum for international economic and financial cooperation. The stature of the group has risen in subsequent years as exercising considerable global influence.

G20 Presidency and meetings

The Presidency of G20 is rotational with each member, enjoying equal opportunity to steer the G20 agenda as

chair for a year and host the summit. India holds the G20 Presidency in 2023. There are two parallel tracks in G20 meetings, the Finance track and the Sherpa track. Finance ministers and central bank governors lead the Finance track while Sherpas lead the Sherpa track. The thematically oriented working groups function within the two tracks. The representatives from the relevant ministries of the members as well as from invited/guest countries and various international organizations participate in these groups. These working groups meet regularly throughout the term of each Presidency. In addition, there are engagement groups which bring together civil societies, parliamentarians, think tanks, women, youth, labour, businesses and researchers of the G20 countries.

Within the Sherpa track, agriculture is an important thematic working group which consists of Agricultural Deputies Meetings (ADMs), Meeting of Agricultural Chief Scientists (MACS) and Agricultural Ministerial Meeting (AMM). The Meeting of MACS in G20 is a scientific track of information exchange on the issues of utmost relevance and crucial needs for joint action in the future. The formal MACS members are the ministries or Governmental bodies responsible for agricultural research in the respective G20 states as well as leading research institutions which strategically advise these decision makers. Other interested countries and

multinational organizations attend MACS as guests. The MACS members are in position to make decisions and to adopt MACS communiqués. The guests participate in advisory capacity. The work of MACS is based on annual meetings hosted by the G20 state which respectively holds G20 presidency.

Previous MACS meetings

MACS was started in 2012 under Mexico Presidency and resulted in a couple of concrete MACS activities led by several G20 states. Since 2012, the MACS discussions were held under following overarching themes (Table 1):

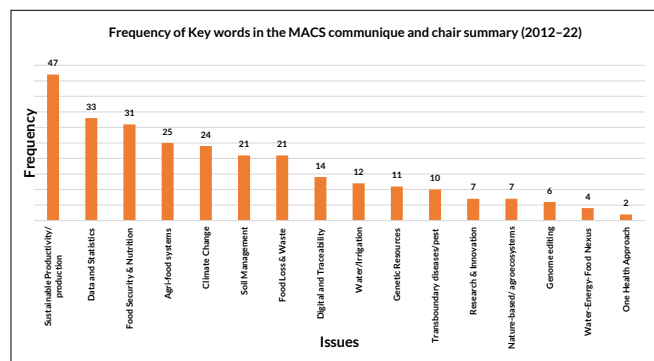
Table 1. Themes of MACS during 2012 to 2022 G20 Presidencies

Year	Presidency	Theme
2012	Mexico	Research and Development Innovations
2013	Russia	Food Security and Nutrition Challenges
2014	Australia	Transformative Productivity and Sustainability Lift
2015	Turkey	Agriculture and Food Security Issues- Supporting Transition towards Sustainable Agriculture and Food Systems
2016	China	Agriculture Technology Innovation and Knowledge Sharing
2017	Germany	Towards Food and Water Security: Fostering Sustainability Advancing Innovations
2018	Argentina	Genome Editing, Sustainable Soil Management and Climate Change Impacts
2019	Japan	Global Research Initiatives-Science based decision Making
2020	Saudi Arabia	Sustainable Agricultural Development in Drylands-Promoting Agricultural Productivity and Sustainability
2021	Italy	Transition Towards More Sustainable Food Systems
2022	Indonesia	Sustainable Intensification to meet Food Security and Environmental Objectives

Table 2. Major issues discussed in the MACS during 2012–22

Year	Presidency	Food Security and Nutrition	Productivity	Agri-food Systems	Climate Change	Soil Management	FLW	Genetic Resources	Water/ Irrigation	Transbound-ary Diseases/ Pests	Digital Traceability
2012	Mexico	✓	✓		✓						
2013	Russia	✓	✓			✓					
2014	Australia	✓	✓	✓	✓			✓			
2015	Turkey	✓	✓	✓	✓	✓			✓		
2016	China	✓	✓	✓	✓	✓	✓		✓		
2017	Germany	✓	✓	✓	✓	✓	✓	✓	✓		✓
2018	Argentina	✓	✓	✓	✓	✓	✓	✓		✓	
2019	Japan	✓	✓	✓	✓	✓	✓			✓	
2020	Saudi Arab	✓	✓	✓	✓	✓	✓		✓	✓	✓
2021	Italy	✓	✓	✓	✓		✓		✓		✓
2022	Indonesia	✓	✓	✓	✓		✓				✓

The frequency estimates of key words in the MACS communiqué and chair summary during 2012 to 2022 revealed that sustainable agricultural system and productivity, food security and nutrition, climate change, soil management, agri-food systems, food loss and waste, digital agriculture, innovations and digital traceability were the most frequently discussed issues. The areas such as One Health, Vaccines and Aquaculture were discussed least.



Food Security and Nutrition, Sustainable Agriculture Productivity, Agri-Food Systems and Climate Change were discussed during all the presidencies showing that these are the long-term issues which are accorded priority by G20 Members. The new issues of global importance were included in the MACS discussions as it advanced. The food loss and waste (FLW) was introduced in 2015, digital agriculture in 2017, genome editing in 2018, dryland agriculture, water-energy-food nexus in 2020 and one health in 2021 (Table 2).

Some of the issues were discussed less frequently such as agricultural biodiversity, local food systems, fertilizer security fisheries and aquaculture-blue revolution, and blue economy; gender empowerment-women farmers, family farming; and small holders farming. Some of these were introduced during India Presidency especially millets, public-private partnership for agri-R&D and nature positive solutions

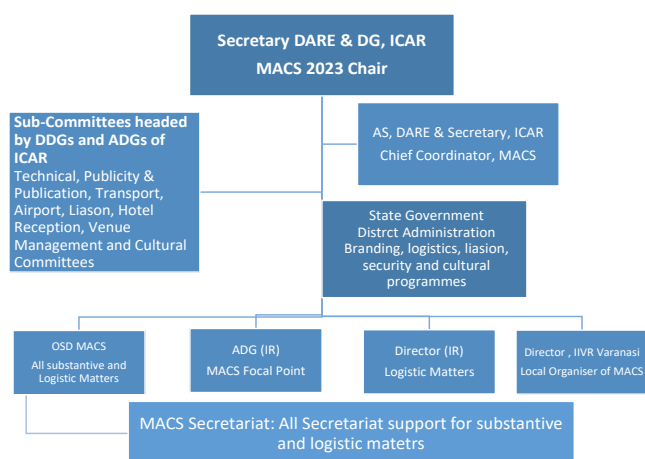
along with the legacy issues of food security, nutrition, climate change, food loss and waste, and digital agriculture.

India Presidency 2023: Meeting of Agricultural Chief Scientists (MACS)

India assumed the rotating Presidency of G20 for one year from 1st December 2022 to 30th November 2023. India, Indonesia and Brazil are the part of 'G20 Troika' in 2023 which is the top grouping within the G20 countries consisting of immediate past, current and the incoming presidencies. MACS 2023 has been steered by DAR-ICAR with Secretary, DARE & DG, ICAR being the MACS 2023 Chair. The ADM and AMM were steered by Department of Agriculture and Farmers Welfare. The Council in consultation of Ministry of External Affairs, Department of Agriculture and Farmers Welfare, G20 Trioka Members and International Organization developed the agenda for organising the discussions. A dedicated MACS Cell with adequate manpower and infrastructure was set up for facilitating the meeting.

ICAR's lead role in MACS 2023

Indian Council of Agricultural Research (ICAR)/DARE has been the nodal agency for organizing the MACS 2023 with Secretary, DARE & DG, ICAR being the MACS 2023 Chair. All the substantive and logistic matters were steered by the International Relations Unit of ICAR with proactive involvement of all the subject matter divisions and Indian Institute of Vegetable Research, Varanasi and State Government and District Administration, Varanasi.



Institutional mechanism put in place in ICAR-DARE for MACS 2023

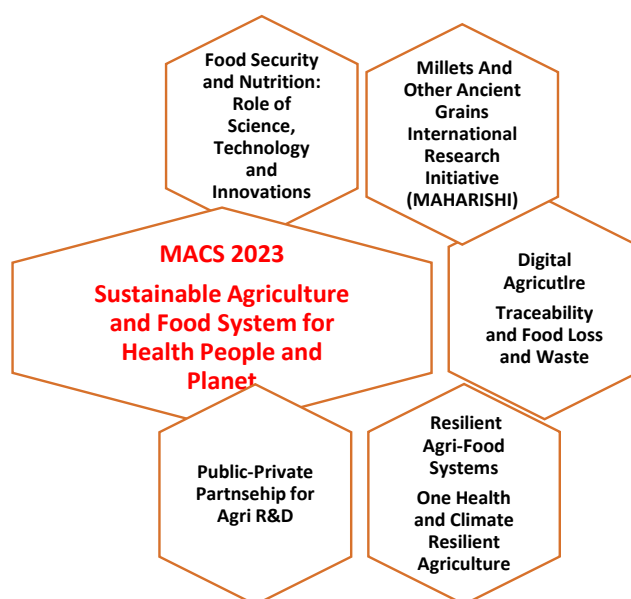
The holy city Kashi (Varanasi) was chosen for hosting the G20 MACS 2023. The meeting was held on 17–19 April, 2023 at Taj Ganges, Varanasi. Apart from the discussions on topical issues of global importance in agriculture, the delegates were also taken to Sarnath, Ganga Aarti and Trade Facilitation Centre. The inaugural session was graced by Hon'ble MoS, Ministry of Transport and Ministry of Civil Aviation General (Rtd.) V K Singh.



Inaugural address by Hon'ble V K Singh MoS Ministry of Transport and Civil Aviation

Key issues of deliberations in MACS 2023

In view of the food and agriculture production systems facing unprecedented challenges worldwide from an increasing demand for food, rising hunger and malnutrition, adverse climate changes effects, etc and in consonance with India's G20 Presidency theme "One Earth, One Family, One Future", the MACS 2023 was held with the theme of 'Sustainable Agriculture and Food Systems for Healthy People and Planet'. The discussions on issues of relevance for food security especially in the context of International Year of Millets, resilience to crisis through climate resilient agriculture and One Health approach, emerging issues e.g. digital agriculture and public-private partnerships for R&D were held. The meeting specifically featured Millets and other Ancient Grains International Research Initiative (MAHARISHI) with emphasis on millets based local food system for agrobiodiversity, food and nutrition security. Additionally, workshops on important global issues like climate change and one health were also planned.



Major areas of discussion during MACS 2023

The key issues that were focussed for scientific deliberations and seeking interventions from the G20 countries, invited guests and international organizations were:

Food security and nutrition: Frontiers in science and technology

The fragilities in our agriculture and food systems became apparent during COVID-19 pandemic and led to increase in hunger, food insecurity and malnutrition. The number of hunger affected people increased by about 150 million post Covid-19 pandemic. The science, technology and innovation (STI) are potential components of evidence-based decision-making for transforming agrifood systems and a key means of implementation of the Sustainable Development Goals (SDGs). The UN Food Systems Summit (UNFSS) 2021 has also emphasised the need to invest in science and innovation for the SDGs.

The landscape of science and innovation is continuously evolving. The G20 MACS focussed discussions on how science, technology and innovation can contribute and provide innovative solutions to achieve the food security and nutrition. The Members emphasized the need for coordinated actions for sharing scientific knowledge and effective use of science, technology and innovation at all levels. It shall be one of the main sources of consolidated and reliable information for achieving the sustainable agriculture and food security. The discussions on millets and other ancient grains led to launch of G20 initiative on Millets and Other Ancient Grains International Research Initiative (MAHARISHI) during India Presidency.

Resilient agrifood systems: One health and climate resilience

One Health is an integrated, unifying approach to sustainably balance and optimize the health of people, plants, animals and ecosystems that are closely linked and inter-dependent. Ensuring a One Health approach is essential for progress to anticipate, prevent, detect, and control diseases that spread between animals and humans as well as combatting many other challenges. The climate resilient technologies and innovations for sustainable agrifood systems including nature-positive agriculture can help in climate change adaptation and

mitigation. The Biological Nitrification Inhibition (BNI) has been proved effective approach contributing to reducing GHG emissions and increasing crop yields. The 12th MACS discussed the topic and emphasised on development of partnerships for coordinated action for promoting One Health approach and setting R&D priorities on transboundary pests and diseases for resilient agrifood systems. MACS also supported enhanced research collaborations for developing climate resilient technologies and practices. The detailed deliberation is also expected to take place on these two important issues during the technical workshop in August 2023.

Digital transformation of agrifood systems

The agri-food value chain is experiencing digital sparks at multiple points and emerging technologies are helping in precision and increase in farm productivity through improving efficiency of agricultural operations. The application of digital technologies is able to provide support to farmers in accessing real-time and accurate advisories, managing and tracking farm activities, connecting farmers with markets and fetching better prices for their produce. The common barriers to adopt digital technologies by the farmers includes up-front investment and recurring maintenance expenses, relevance and limited use cases, user-friendliness, high operator skill requirements and technological risks. G20 Members emphasised at exchanging information and knowledge about successful digital agriculture initiatives and learn from each other's experiences to address the barriers. The MACS supported, promoting collaborations among G20 Members, Guests and International Organizations to exchange experiences and lessons learnt on digital technologies, traceability and application of digital solutions for reduction of food loss and waste.

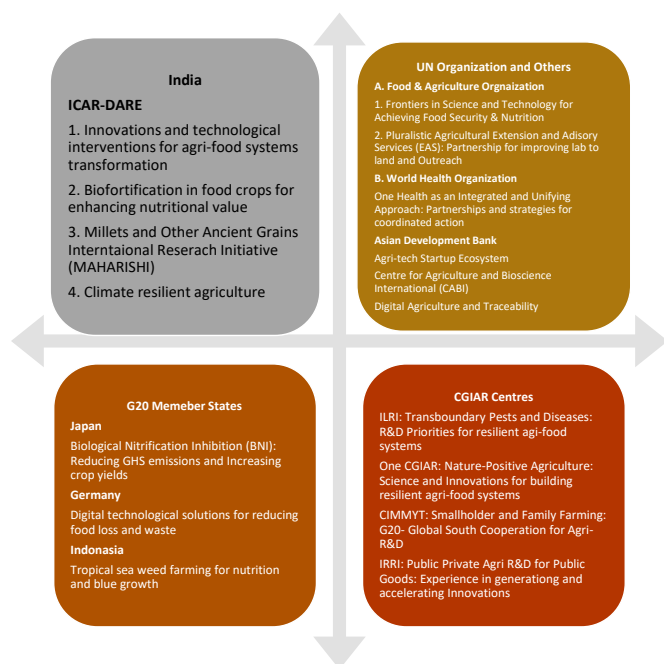
Public private partnership in Agri-R&D

The Public-Private partnerships serve as a primary resource in co-development of technologies and practices. Establishing strategic links between public and private entities provide access to significant finance for research, agricultural extension and advisory services, testing and evaluation activities. It provides crosscutting capabilities to execute responsibilities collaboratively with diverse stakeholders which become more innovative, integrated and effective contributor to develop science-based technological solutions and practices for achieving sustainable, resilient, inclusive agri-food systems. It may contribute various areas of work including technology development, operational experimentation, testing and evaluation, technology transfer and commercialization, building laboratory facilities and products, etc. The 12th MACS discussed the opportunities and risks of public-private partnership in agricultural R&D for achieving food security and nutrition.

Under the Presidency of India and the lead role of ICAR/DARE for MACS 2023, the United Nation



Address by Dr. Himanshu Pathak, Secretary (DARE) & DG (ICAR) and MACS 2023 Chair



Topics and resource partners in MACS 2023

Organizations, G20 Member States, CGIAR Centres and International and Regional Organizations joined ICAR/DARE to develop the agenda and setting the context for seeking the interventions of the G20 Member States on various issues of global importance.

Outcomes

The final outcome of the MACS 2023 has been very encouraging with all the G20 members and accepted the followings:

- **Food Security and Nutrition:** Safeguard the global food security and nutrition by strengthening G20 efforts towards sustainable agriculture and food systems by leveraging science, technology and innovations.
- **Biofortification of Food Crops:** Coordinated R&D efforts to provide nutrient rich varieties of food crops for the benefit of farmers and consumers.
- **Research and Innovation in Agriculture:** Sharing knowledge, experience and best practices in sustainable agriculture and food systems. Intensify research and its implementation and deepen effective collaborations between national and international research organizations for sustainable agricultural development.
- **Climate Change Adaptation and Mitigation:** R&D Collaborations between public and private sector

to build resilient agriculture and food systems, find solutions for climate change adaptation and mitigation without adverse effects on food security, protect and enhance biodiversity, and help to improve productivity and profitability sustainably in global agri-food value chains.

- **Digital Agriculture:** Recognized the digital transformation of agriculture and food systems in improving sustainability and outcomes for farmers. Promote research and extension to improve responsible, sustainable and inclusive use and application of digital technologies for food production and safety, climate resilience, circular economy principles, and preventing food loss and waste
- **Public-Private Investments and Partnerships:** Encourage increased public-private investments and partnerships for improving communication and adoption of innovative tools, agricultural practices and technologies that meet the needs of stakeholders.
- **One Health and Transboundary Diseases:** Recognize the enhanced need of cooperation and research on transboundary diseases and One Health issues.
- **MAHARISHI:** Supported the launch of the "Millets and Other Ancient Grains International Research Initiative (MAHARISHI) to strengthen the research collaboration and public awareness of these grain crops.

SUMMARY

The focus is needed to safeguard the global food security and nutrition by strengthening G20 efforts towards sustainable agriculture and food systems by leveraging science, technology and innovations. The coordinated emphasis is important on research and innovation in agriculture, therefore sharing knowledge, experience and best practices in sustainable agriculture and food systems is apt. Effective collaborations between national and international research organizations is prime to intensify research to build resilient agriculture and food systems, find solutions for climate change adaptation and mitigation. Recognize the enhanced need of cooperation and research on transboundary diseases and One Health issues and strengthen the research collaboration and public awareness of millet crops.

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**Plant trees, Conserve water,
Protect environment.**

