



MARS



PERÚ

Ministerio
de Agricultura y Riego

International Symposium on Cocoa Research

2017

Promoting Advances in Research to Enhance
the Profitability of Cocoa Farming

13-17 November 2018, Lima, Peru

Reports - Thematic Sessions Recommendations

Brigitte Laliberte, Bioversity International
Chair of the ISCR 2017 Scientific Committee

**WORLD
COCOA
CONFERENCE 2018**



22-25 APRIL 2018
MARITIM HOTEL BERLIN
BERLIN, GERMANY



Objective and General Theme

- **Review recent advances in technology and innovations, share information and agree on common strategies**
 - Aimed at accelerating the development of the world cocoa sector.
 - To improve livelihoods in cocoa farming communities.
- **Promoting Advances in Research to Enhance the Profitability of Cocoa Farming**



Scientific Committee

Appointed by ICCO – To review papers, develop the programme and advise on ISCR organization

1. **Brigitte Laliberté** - Bioversity International, Italy - **Chair**
2. **Carlos Leyva** - Senasa, Peru
3. **Christian Cilas** - CIRAD, France
4. **David Guest** - The University of Sydney, Australia
5. **Elizabeth Johnson**, IICA, Jamaica
6. **Franklin Manu Amoah** - CRIG, Ghana
7. **Martin Gilmour** - Mars Global Chocolate, UK
8. **Michelle End** - CRA Ltd. UK
9. **Nanga Coulibaly** - CCC, Côte d'Ivoire
10. **Path Umaharan** – CRC/UWI, Trinidad and Tobago
11. **Paul Hadley** - University of Reading, UK
12. **Siela Maximova** - Penn State University, USA
13. **Soetanto Abdoellah** - ICCRI, Indonesia
14. **Verina Ingram** - Wageningen University, The Netherlands
15. **Wilbert Phillips-Mora** - CATIE, Costa Rica



Thematic Areas and Abstracts

Submission Deadline 31 May 2017

277 Abstracts submitted

	Thematic Area	%
1	Climate Change Adaptation & Mitigation	18
2	Genetics & Breeding	23
3	Marketing & Technology Transfer	20
4	Pests & Diseases	5
5	Quality, Flavour Sensory Evaluation & Post Harvest	16
6	Agronomy & Crop Systems	9
7	Contaminant & Food Safety – focus on Cadmium	9
	Total	100
	<p>Friday 17 November – INCOCOA GROUPS http://incocoa.org</p> <ul style="list-style-type: none"> • INGENIC - Cocoa Genetics and Breeding • INCOPED - Cocoa Pests and Diseases • INAFORRESTA - Cocoa Agroforestry and Environmental Interaction • INCOSOM - Cocoa Soil Management • INCOQUALITY - Discussion to establish a new group on cocoa quality 	



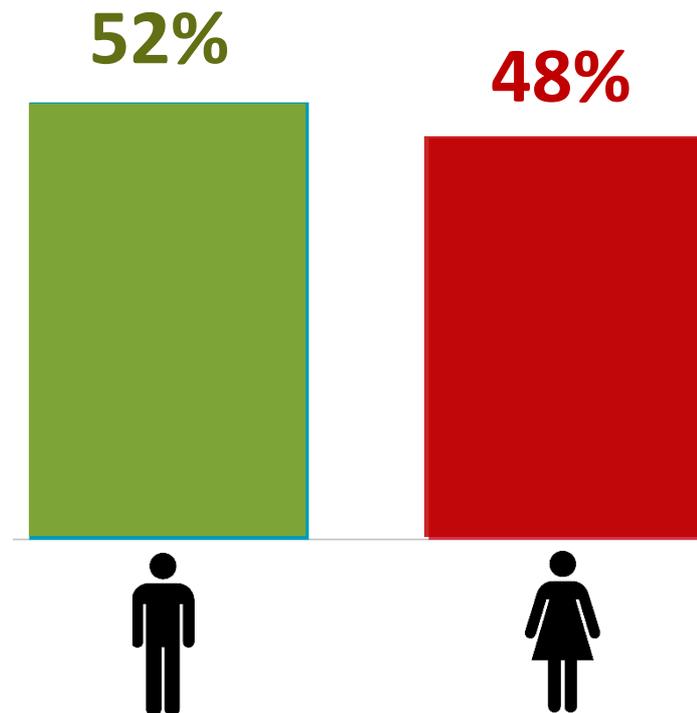
Abstract Review

Researchers invited to submit abstracts of their research work to be considered for presentation at the ISCR 2017 and for publication as papers in the ISCR 2017 Proceedings.

For each Thematic Area	Total
• Keynote presentations – <i>15 minutes</i>	9
• Oral presentations – <i>10 minutes</i>	85
• Poster slam - oral presentations – <i>1 minute</i> – present key features and invite people to visit!	70
• Posters displayed during the 5 days	130
• Full paper invited – to be included in the proceedings	215

Participants

- More than 450 researchers and those whose work is impacted by advances in research – public and private sector:
 - Cocoa industry - traders, processors, manufacturers
 - Public research institutes
 - Universities
 - Development agencies
 - Policy makers
 - Civil societies





Recommendations

- TS1 - Climate Change Adaptation & Mitigation
- TS2 - Genetics & Breeding
- TS3 - Marketing & Technology Transfer
- TS4 - Pests and Diseases
- TS5 - Quality, Flavour & Post-harvest
- TS6 - Agronomy & Crop Systems
- TS7 - Cadmium & other contaminants



ISCR report – available: <https://www.icco.org/about-us/icco-news/381-international-cocoa-research-symposium-draws-500-attendees-to-lima-peru.html>



Advances



Advances – Climate Change

1. Knowledge from different cocoa genotypes on responses to drought, heat and CO₂ and other environmental factors
2. Large variation in genotypic response suggesting a huge scope in breeding resilient planting materials.
3. Physiological traits identified for screening germplasm for breeding work.
4. Drought tolerant cultivars identified based on osmotic adjustment.
5. Potential impact of climate change on pest and diseases reviewed.
6. Progress made on modelling water requirements for cocoa production and impact of climate change at regional and national scales.
7. Appropriate use of shade/companion planting species (*Gliricidia*) and agroforestry systems can help mitigate drought stress.
8. Shade management has important links with pest and diseases, particularly under scenarios of climate change.
9. Simple treatments found effective in reducing moisture loss e.g. plastic sheeting/organic materials used as mulch and shading.



Advances – Genetics, Breeding, Agronomy, Pests & Diseases

1. Management of P&D improved through better understanding of biology and environment interactions.
2. Agronomic systems and particularly agroforestry systems better known.
3. Good characterization of flora, fauna, nematodes, associated with cocoa production system.
4. More insect families involved in pollination than previously reported.
5. Efficient modelling for management (pruning, water)
6. Agroforestry systems can diversify farmers' income, improving sustainability.
7. Progress from national breeding programmes including on-station and on-farm trials.
8. Morphological and molecular characterization of germplasm collections to better understand genetic diversity available for improved planting materials.
9. New molecular tools developed including Genome Wide Association Studies (GWAS), gene editing, cell cultures, use of transcription factors for increasing somatic embryogenesis and mapping genes for compatibility.
10. New molecular tool CRISPR/CAS9 can improve understanding of host-pathogen interactions.
11. Targeted and timed pruning and sanitation is a good starting point for the management of most pests and diseases.
12. Shade management relevant in controlling Cocoa Swollen Shoot Virus Disease (CSSVD) by avoiding species hosting the virus.
13. CSSVD diagnostic tools reliable, supporting improved detection and biosecurity.
14. Durable resistance to Frosty Pod Rot (FPR) developed by incorporating polygenic resistance.



Advances – Quality, Flavour Evaluation & Post Harvest

1. Increased direct links between chocolatiers and producers.
2. Environmental effects on quality is beginning to be appreciated, and the notion of “terroir” is gaining recognition.
3. Increased understanding of fermentation chemistry and quality.
4. Progress on objective methodologies to complement traditional sensory work.
5. Progress made on draft international standards for flavour assessment.
6. Cocoa of Excellence (CoEx) Programme getting stronger.
7. Many examples of farmers’ participatory engagement in flavour quality assessment.
8. Tailored fermentation development, not “one size fits all”.
9. Progress on molecular fingerprinting and possible role in traceability.



Advances – Cadmium & Food Contaminants

1. Great progress made in mapping soil cadmium levels in LAC countries.
2. Advances in understanding pathways to cadmium contamination of beans - soil factors influencing cadmium availability to the plant, genotypic effects and anthropological sources.
3. Advances in mitigation research at laboratory, greenhouse and field levels - ECA/CAOBISCO/FCC project and others (modifying pH, addition of biochar, vermicompost, soil fixation and immobilization of cadmium, blocking of transporters, grafting on rootstocks).
4. Agreement on methods for assessing total and available cadmium in soils and beans.
5. Different cocoa genotypes responses to acidic soils, ranging from intolerant to tolerant.
6. Promising planting materials included in selections with high yield, good quality and disease resistance.
7. Various cropping systems validated for integrated management systems reducing cadmium uptake.



Advances – Marketing & Technology Transfer

1. Socio-economic studies providing sound baseline data on aspects: farm economics, working conditions, health/nutrition, gender issues and agricultural practices.
2. Analyses of the effects of training programmes on farmers' incomes, cocoa productivity, working conditions and environmental conditions and identify challenges such as rewarding improved quality with price.
3. Effective mechanisms of technology transfer through ITC, literature review and new farmer surveys.
4. Benefits of farmers diversifying food crops for food security and extra income recognised.
5. New approaches to attracting youth and entrepreneurs into cocoa farming through improved access to information, training and promotion of business opportunities being tested.
6. Prospects for innovations such as new products, labour-saving devices and improved access to credit and markets.



Recommendations



Recommendations – Climate Change

1. Need for better climate data to improve models and predict impact of climate change on cocoa value chain.
2. Identify physiological models for cocoa responses to climate change.
3. Further exploration of genetic diversity for traits which confer increased resilience to climate change.
4. Multidisciplinary and ecosystem-based approach for solutions of new scenarios of climate change.
5. Ensure that knowledge on approaches to mitigate against abiotic stress is shared with farmers in a timely and practical way.



Recommendations – Pests & Diseases

1. More research on physiology and impacts of climate change on epidemiology and on pests and diseases.
2. Research on temperature effect on key aspects of cocoa pests biology.
3. More research on response of cacao genotypes to acid soils and resilience to aluminium toxicity.
4. Ensure appropriate training is provided to farmers to ensure that IPM systems are widely adopted.
5. Each country should develop biosecurity plans for incursions of a new diseases with coordination between neighbouring countries.
6. Strengthen educational mechanisms to avoid the spread of pests and diseases.
7. Improve diagnostics and biosecurity protocols to accurately detect CSSV in breeding collections, nurseries and farms.



Recommendations – Genetics, Agronomy & Breeding

1. Foster efforts to create new varieties with durable pest and diseases resistance, fundamental for a perennial crop grown by small farmers with limited capacity to change their planting material.
2. Advance breeding through better integration of conventional and new approaches.
3. Accelerate the introduction of new improved planting materials that meet farmers' needs and quality requirements of those who buy their cocoa and consume it.
4. Continue conserving germplasm using participatory approaches and involving farmers in the selection of genotypes to conserve.
5. Improve agroforestry systems - design and selection of species to associate with cocoa.



Recommendations – Quality, Flavour Evaluation & Post Harvest

1. Engage the broader industry in the development of standards for quality and flavour assessment and link to industry quality manual, ISO, certification bodies, ICCO, ECA/Caobisco/FCC and others.
2. Research on current cost/benefit to farmers of improving quality and incentives in sustaining high quality.
3. Industry discussion on fingerprinting/traceability - needs, reliability, costs, links to paper systems, role in combatting deforestation.



Recommendations – Cadmium & Food Contaminants

1. Greater coordination between countries to share best practices and knowledge on cadmium mitigation.
2. More research to understand correlation between levels in soil, leaves and beans.
3. Validation of methods in different countries to managing cadmium in different soil types.
4. The genetic strategy (grafting) is a viable option but needs validation in a range of soil types and cadmium levels.
5. Research to identify genotypes with good agronomic characteristics and low accumulation levels.
6. Greater funding and coordination to implement practices in countries lagging behind and bring together development agencies, NGOs and research organizations.
7. LAC institutes to continue to input in the development of an STDF project proposal (lead by ICCO and CABI) to coordinate, share information between countries and validate results in various agro-ecologies.
8. Acknowledge differences in the risk assessments for cadmium consumption from cocoa products used by JECFA and EFSA, and their implications for setting maximum levels.
9. Some level of mediation should be pursued to extend the EU deadline for cadmium levels given the advances made in research.



Recommendations – Marketing & Technology Transfer

1. Interdisciplinary research approaches to support the full range of farmers needs from seed to sale.
2. Engage women and youth through income diversification, development of labour-saving tools, value adding and enterprise incubation.
3. Further research on how farmers can adopt the recommendations and access the resources needed.
4. Improve equitable and flexible access to finance, education and health services.
5. Improve marketing skills so growers can negotiate equally with specialty buyers.
6. Greater use of ITC to complement conventional extension.
7. Better data-sharing from both public and private research to improve analyses of current status and impact assessments.
8. In-depth evaluation of success of training and adoption of farmer-centric approaches to maximise adoption.

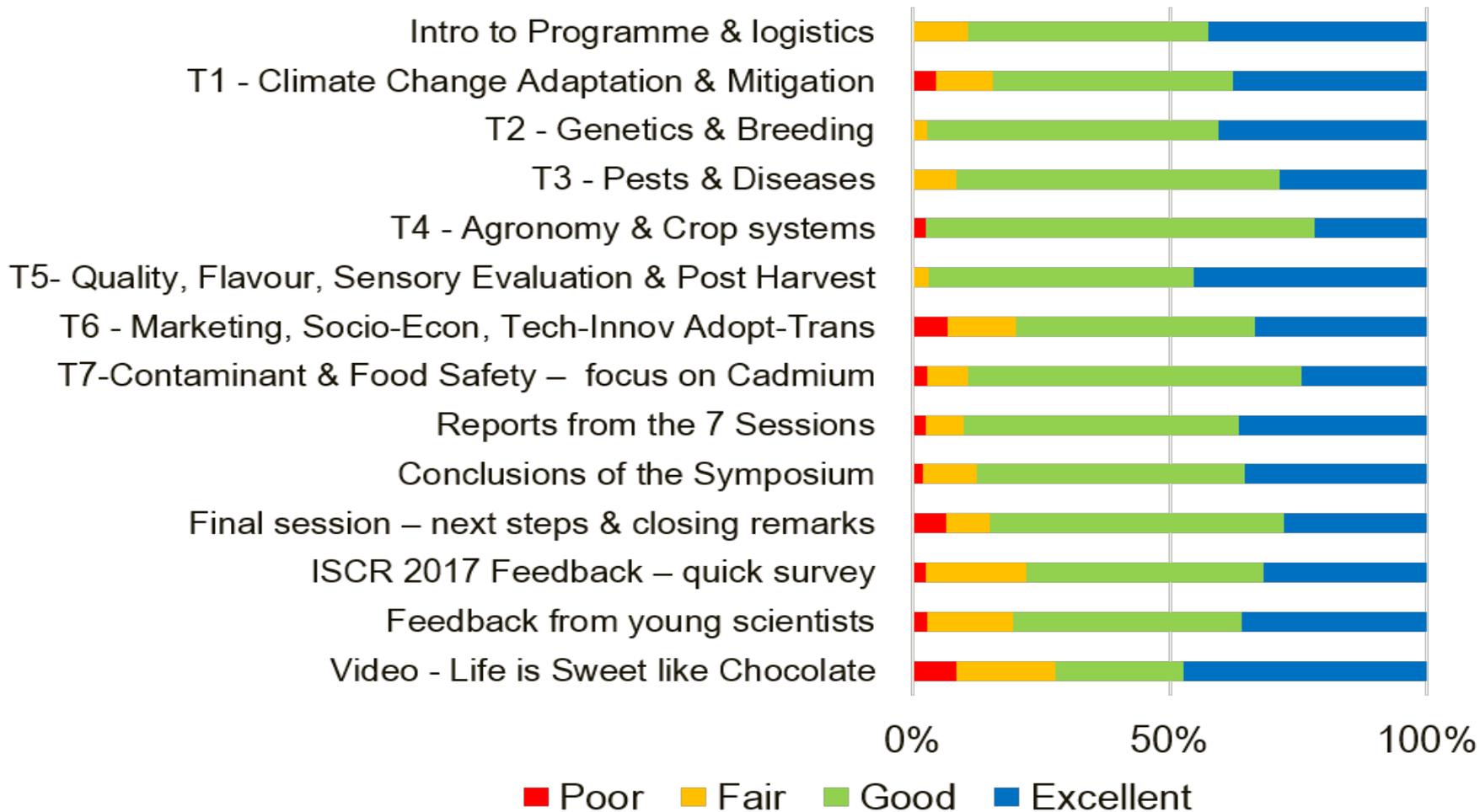


ICR
2017

Point of view – young scientists



Post ISCR Survey





Next steps

- ISCR 2017 Proceedings
- Next ISCR – dates and venue to be determined



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**Thank you and see you
at the next ISCR!**