2017 ISCR, Lima, Peru 13 – 16 Nov 2017

Report from the 2017 ISCR Scientific Committee for the 7 Thematic Areas

Presented in plenary on Thursday 16th November 2017

Contents

Introduction

The International Cocoa Organization (ICCO), in partnership with the Government of Peru, organized the International Symposium on Cocoa Research – ISCR 2017 - held in Lima, Peru from 13 to 17 November 2017, to review recent advances in technology and innovations, share information and agree on common strategies aimed at accelerating the development of the 2017 world cocoa sector.

The general theme of the ISCR 2017 was "Promoting Advances in Research to Enhance the Profitability of Cocoa Farming". The present economic environment and the future sustainability of cocoa production and trade present major challenges, and require advances in research in order to improve livelihoods in cocoa farming communities and along the cocoa value chain.

The Symposium was the first in a series to be organized as part of ICCO activities aimed at encouraging research and the implementation of its findings, through the promotion of training and information programmes, leading to the transfer of technologies to the stakeholders in the cocoa value chain as part of achieving a sustainable world cocoa economy. The objective is to continue to provide a platform for the cocoa community and scientists to exchange the latest findings on research innovations, to ensure that these results are widely disseminated and adopted among cocoa farmers and traders, and to agree on priorities for collective action.

Thematic Areas

The ISCR 2017 provided an opportunity for the presentation of research papers and discussions focussed on the following thematic areas:

1. Cocoa genetics and breeding (including genetic resources and diversity, genomics, accelerated/traditional breeding and propagation);
2. Cocoa agronomy, agroforestry and physiology (including soil and water management, cocoa nutrition management, heavy metals, crop mechanization and irrigation);
3. Cocoa pests and diseases (emerging threats, management etc.);
4. Environmental issues in the cocoa sector (including climate change adaptation and mitigation, sustainability for smallholders, intensified and mechanised systems);
5. Cocoa quality, flavour, chocolate manufacturing, consumption and food safety (including efficient utilization of cocoa and cocoa by-products);
6. Cocoa marketing and socio-economic analysis (including the role of cocoa farmers' livelihood strategies, living income, improved value chains and market access); and
7. Adoption of technologies and efficient utilization of results from cocoa research (with a focus on understanding and addressing the constraints to adoption).

Participants

The Symposium brought together more than 450 researchers from the public and private sector from across the world that carry out research in cocoa, as well as policy makers, representatives of development agencies, civil society and the cocoa industry, including traders, processors and manufacturers, whose work is impacted by advances in research. The gender balance based on responses from 184 participants indicate 52% men and 48% women.

Researchers on cocoa and cocoa related issues from public and private sectors had been invited to submit abstracts of their research work to be considered for presentation at the ISCR 2017 and for publication as full papers in the ISCR 2017 Proceedings.

Scientific Committee

The ICCO Secretariat has appointed a Scientific Committee to be responsible for developing the programme of the ISCR 2017 and to advise the ICCO on the overall organization of the event. The Scientific Committee, through its chairperson Brigitte Laliberté, reported to the Executive Director of ICCO and submitted regular updates on the preparation and organization of the ISCR 2017. The members of the Scientific Committee are:

1. Brigitte Laliberté, Bioversity International, Italy - Chair
2. Carlos Leyva, Servicio Nacional de Sanidad Agraria (Senasa), Peru
3. Christian Cilas, Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD), France
4. David Guest, The University of Sydney, Australia
5. Elizabeth Johnson, Inter-American Institute for Cooperation on Agriculture (IICA), Jamaica
6. Franklin Manu Amoah, Cocoa Research Institute of Ghana (CRIG), Ghana
7. Martin Gilmour, Mars Global Chocolate, UK
8. Michelle End, Cocoa Research Association (CRA) Ltd. UK representing the INCOCOA groups
9. Nanga Coulibaly, Conseil Café Cacao (CCC), Côte d'Ivoire
10. Path Umaharan, Cocoa Research Centre of the University of the West Indies (CRC/UWI), Trinidad and Tobago
11. Paul Hadley, University of Reading, UK
12. Siela Maximova, Penn State University, USA
13. Soetanto Abdoellah, Indonesia Cocoa and Coffee Research Institute (ICCRI), Indonesia
14. Verina Ingram, Wageningen University, The Netherlands
15. Wilbert Phillips-Mora, Centro Agronómico Tropical de Investigación y Enseñanz (CATIE), Costa Rica
16. Yunusa Abubakar, International Cocoa Organization (ICCO) representative, Côte d'Ivoire

Abstract submission

Abstracts were submitted online from 1 May 2017 with the deadline of 31 May 2017. Each abstract should address one of the seven thematic areas, could be submitted in English, French or Spanish and limited to a maximum of 400 words. Notification of acceptance of all selected abstracts were sent out in early August.

The following number of abstracts were submitted for each of the 7 Thematic Areas:

Thematic Area	Total
1. Agronomy, agroforestry & physiology	**63**
2. Cocoa pests & diseases	**55**
3. Genetics & Breeding	**50**
4. Cocoa quality, flavour, chocolate manufacturing, consumption & food safety	**44**
5. Cocoa marketing & socio-economic analysis	**25**
6. Adoption of technologies & efficient utilization of results from research	**25**
7. Environmental issues in the cocoa sector	**15**
Total	**277**

Based on the actual submission of abstracts, the Thematic Areas were revised, from the original title to the following on the right:

	Original Thematic Area	Revised Thematic Areas
1	Genetics & Breeding	T1 - Genetics & Breeding
2	Agronomy, agroforestry & physiology	T2 - Agronomic or Crop systems
3	Cocoa pests & diseases	T3 - Pests & Diseases
4	Environmental issues in the cocoa sector	T4 - Climate Change Adaptation & Mitigation
5	Cocoa quality, flavour, chocolate manufacturing, consumption & food safety	T5 - Quality, Flavour & Sensory Evaluation & Post Harvest
6	Cocoa marketing & socio-economic analysis	T6 – Contaminant & Food Safety – focus on Cadmium
7	Adoption of technologies & efficient utilization of results from research	T7 - Marketing, Socio-Economics & Technology/ innovation adoption/transfer

The ISCR 2017 Programme developed by the Scientific Committee included the following number of presentations and posters.

• Oral presentations – 10 min	85
• Keynote presentations – 15 min	9
• Poster slam - oral presentations - key features	70
• Posters displayed until Thursday afternoon	130
• Full paper invited – to be included in the proceedings	215

All Thematic Area sessions were organised and chaired by members of the Scientific Committee.

The following documents are available from the ISCR website:
https://www.icco.org/iscr2017/programme.html

- ISCR 2017 Programme
- ISCR 2017 Condensed Draft Programme
- Booklet of ISCR 2017 Abstracts
- ISCR Draft Participants List

Reports from the 7 Thematic Areas

The Members of the Scientific Committee reported in plenary to all participants the main advances, perspectives and recommendations for each of the 7 Revised Thematic Areas on Thursday 16th November. And the key points are reported below.

A - Thematic Session – Climate Change Adaptation and Mitigation

A1. Advances

1. Models based on data suggests that temperature increases, increased evaporative demand and reduced water availability are the main concerns for cocoa production. Progress made on modelling the current water requirements for cocoa productions and impact of climate change on regional and national scales.
2. Improved understanding of the ways in which cocoa plants respond to environmental factors likely to be affected by climate change; Higher CO_2 concentration can ameliorate negative effects of water stress. Increased levels of CO_2 increase water-use efficiency, effects noted for vegetative growth, pod (mainly husk) and bean dry weight (but effects on pod growth only apparent after 2 years).
3. More knowledge on cocoa responses to drought, heat and CO_2 generated for different genotypes. Physiological differences between genotypes can be used as basis for selection for drought tolerance and nutrient use efficiency in breeding work and the large variation in genotypic response observed to date suggests that there is huge scope in breeding cocoa genotypes that are more resilient to abiotic stresses.
4. Cultivars identified as drought tolerant based on osmotic adjustment. A review of the literature suggests a number of possible physiological traits that could be further investigated for their potential use in screening germplasm for inclusion in breeding work.
5. Simple treatments found effective in reducing moisture loss e.g. plastic sheeting/organic materials used as mulch and shading. Appropriate use of shade/companion planting species (Gliricidia) and agroforestry systems can help mitigate against drought stress.

A2. Perspectives

1. A holistic view is needed on climate change and its potential to affect livelihoods along the cocoa value chain. This includes not only the effects on the cacao plant itself and its yield and quality, but also the impact on its pests and diseases, soil management and other agronomic practices.
2. Need for better climate data and better physiological models to help predict impacts of climate change on cocoa, including more information and ability to model on extreme events such as hurricanes, prolonged drought and others, since most of the current models are based on 25+year averages and would not take extremes into account.
3. There is considerable scope to breed improved planting materials, for example with greater stomatal regulation capacity and other traits, which will confer resilience and better performance under sub-optimal conditions [or climate change conditions?]
4. However, improved planting materials should only be part of the overall strategy and a range of short and long-term climate mitigation and adaptation options should be investigated
5. Lack of funding is the main problem.
6. Need for capacity building and a collaborative approach in climate change research.
7. Need to consider the socio-economic aspects and study how farmers can and will adopt the recommendations and access the resources needed.

A3. Recommendations

1 Ensure existing knowledge on approaches to mitigating against abiotic stress is shared with farmers in a timely and practical way, for example on information that farmers could use on mulching and which of currently recommended selections perform better under drought.
2. Need better climate data to improve existing models and better predict impact of climate change on cocoa value chain.
3. Need to explore genetic diversity for traits which confer increased resilience to climate change and ensure breeding programmes are able to incorporate these characteristics in to improved planting materials which meet farmers' needs and the quality requirements of those who buy their cocoa and the consumers.
4. Identify physiological models for cacao in response to climate change (increased temperature, CO_2, decreased water and nutrient-use efficiency) and cropping system (including agroforestry)
5. More research on impacts of climate change on epidemiology and impact of pests and diseases
6. Further research to establish how farmers can and will adopt the recommendations and access the resources needed.
7. Encourage public-private partnerships to support an international doctoral training fund for projects on climate change in cocoa with a view to improving collaboration and building capacity in climate change research.
8. Need to work within an agreed framework of climate change variables as adopted for other crops.

B - Thematic Session – Genetics & Breeding

B1. Advances

1. Advancement in the morphological and molecular characterization of various germplasm collections to better understand their genetic diversity and kinship.
2. Progress reported from national breeding programmes including on station and on-farm trials. Promising new planting materials include selections with high yield, good quality and disease resistance characteristics.
3. New molecular tools have been developed for cacao research including Genome Wide Association Studies (GWAS), gene editing, cell cultures, utilization of transcription factors for increasing somatic embryogenesis and mapping genes for compatibility.

B2. Perspectives

1. Advances in cocoa research are very slow and farmers have seen very little improvement in yields on their farms. Funding and the application of existing knowledge are required.
2. Need to involve farmers in the development of planting materials to ensure they meet their requirements.
3. Farmer knowledge of local planting materials may be valuable in collecting and conserving germplasm in areas where cacao is indigenous.
4. Only few researchers are conducting advanced molecular studies.
5. Good progress has been made on characterizing the genetic diversity available but emphasis now needs to be placed on using it efficiently in breeding work which can deliver improved planting materials to the farmers.
6. Uniformity/standardization in application of research methods will help to improve interpretation and application of results.

7. Systems thinking can help increase impact of our work.
8. Cacao science community is not well coordinated or supported.
9. Need to utilize knowledge gained from genetics and performance of cocoa clones and convert basic research information into knowledge and improved planting materials for the farmers. Time to move to next step.

B3. Recommendations

1. Design and teach interdisciplinary research approaches that will support the full range of farmers needs from seed to sale.
2. Need to consider benefits of sharing germplasm and information, and to develop incentives for national programmes to share.
3. Development of universal fingerprinting panel for cocoa genotypes and universal set of common genotypes to do population studies.
4. Need to advance breeding through better integration of conventional and new approaches and find ways to accelerate the introduction of new improved planting materials for the farmers.
5. Need to develop phenomics tools (phenotyping) of plants in different sites to aid reliable selection of traits.
6. Need to help farmers better manage cocoa production systems to capitalize on the potential of the materials in the fields.
7. Need to continue conserving germplasm using participatory approaches important to farmers and involve farmers in the selection of genotypes to conserve.

C. Thematic Session – Marketing and Technology Transfer

C1. Advances

1. Socio-economic studies, based on data collated from published literature and new surveys, are providing sound baseline data on aspects such as current farm economics, working conditions, health/nutrition, gender issues and agricultural practices.
2. Analyses of sustainability initiatives are recognising the risk that that most training programs are designed from the perspective that this is what we think farmers should do. These analyses also provide insight into the effects on their impacts on farmers' incomes, cocoa productivity, working conditions and environmental conditions and identify challenges such as rewarding improved quality with price
3. New approaches to attracting youth and entrepreneurs into cocoa farming through improved access to information, training and promotion of business opportunities are being trialled
4. A better understanding of effective mechanisms to transfer technology, including through the Information and Communication Technology is being gained, through reviewing existing academic literature and new farmer surveys
5. Prospects for innovations such as new products, labour-saving devices and improved access to credit and markets
6. Benefits of farmers diversifying into food crops for food security and extra income are recognised.

C2. Perspectives

1. Millions spent on farmer training, but adoption rates are poor.
2. The majority of smallholders live in poverty and lack the market certainty, incentives, financial and labour capacity to implement most training, leading to poor adoption rates

3. Much training does not reach women and their role in cocoa production remains underestimated
4. Cocoa farming is not attractive to young people who lack access to land.
5. Older farmers are risk averse and suffer poor health, constraining labour and investment.
6. Simplistic interventions don't work everywhere and often lead to unexpected consequences.
7. Parameter for success of training only indicated by number of trainees, not by how deep the material of training is understood by trainees, and adoption or implementation in the field.

C3. Recommendations

1. Adopt interdisciplinary approaches to technology development and transfer that recognise limitations from the farmer's perspectives
2. Engage women and youth through income diversification, development of labour-saving tools, value adding and enterprise incubation.
3. Improve equitable and flexible access to finance, education and health services.
4. Training to improve marketing skills so growers can negotiate equally with specialty buyers.
5. Avoid reinventing the wheel and look beyond the box by embracing interdisciplinary partnerships.
6. Build on advances in information and communication technology to complement conventional extension
7. Encourage better data-sharing from both public and private research to improve analyses of current status and impact assessments
8. More in-depth evaluation of success of training and adoption of farmer-centric approach to maximise adoption.
9. Ensure training programmes are coordinated to avoid "training fatigue" and mixed messaging.

D. Thematic Session – Pests and Diseases

D1. Advances

1. The potential impact of climate change on pest and diseases has been reviewed by examining published literature on the effects of climate change variables on pests and pathogens. Gaps in our knowledge have been identified.
2. Management of pest and diseases being improved thorough a better understanding of biology and environment interactions.
3. Shade management has important connections with pest and diseases, particularly under the challenging scenarios of climate change. The practice has relevance in controlling Cocoa Swollen Shoot Virus Disease (CSSVD) by avoiding species hosting the virus.
4. CSSVD diagnostic tools more reliable, supporting improved detection and biosecurity.
5. Targeted and timed pruning and sanitation is good starting point for the management of most pest and diseases.
6. Durable resistance to Frosty Pod Rot (FPR) developed by incorporating polygenic resistance into agronomically useful genotypes.
7. *Moniliophthora roreri* (causal agent of FPR) present across diverse regions of Colombia as clonal populations containing different levels of diversity. This suggests the need for region-specific management and the necessity to establish regional quarantine regulations within the country.
8. Cocoa clones with dissimilar reactions against *M. roreri* respond differently under diverse microenvironment conditions: the resistant clones have a stable reaction and the intermediate clones have a variable behaviour.

9. New molecular tools such as CRISPR/CAS9 systems can improve our understanding of host/pathogen interactions since they can be used to repair and insert genes, generate mutants for each gene of cacao and determine gene function.

D2. Perspectives

1. Climate change will continue to impact both cacao cultivation and spread of pests & diseases.
2. Most important impacts expected with climatic change: cocoa will be grown in suboptimal conditions in large areas in West Africa and plants under stress are likely to be more susceptible to pest and diseases.
3. Climate change can lead to emergence of new pests and diseases as seen recently with *Carmenta* spp in Peru and *Achaea catocaloides* Guénée in Côte d'Ivoire.
4. Minor pathogens, like *Verticillium* spp. evident in stressed plants may become more prominent as cocoa plants become stressed in suboptimal climatic conditions.
5. Aging farmers, depleted soils and poorly managed cocoa vulnerable to the emergence of new pests and diseases.
6. Farmers can barely manage present problems with little disease management practices adopted. It will be difficult to explain the uncertainty of effects of climatic change to farmers in order to get them to take required action.
7. Indiscriminate use of pesticides may arise from the increased pressure of pests and diseases caused by climatic change. This would affect beneficial insects including pollinators and predators of pest species.

D3. Recommendations

1. Under new scenarios of climate change, pest and diseases solutions need a multidisciplinary and ecosystem based approach to secure the funding required.
2. Develop research on the effect of temperature on key aspects of the biology of cocoa pests such as pod borer and mealybugs.
3. Develop/modify Integrated Pest Management (IPM) systems, which may require the development of appropriate Biological Control agents, to take into account changes to the ecosystem due to climate change. Ensure that appropriate training is provided to farmers to ensure that IPM is widely adopted
4. Each country has to develop biosecurity plans to establish how to proceed when there is an incursion of a new disease. Coordination of activities between neighbouring countries and regions is essential since pest and diseases know no boundaries
5. Strengthen educational mechanisms to avoid the spread of pests and diseases.
6. Understand the presence of CSSV in asymptomatic cocoa and alternative hosts and the threats these pose to cocoa.
7. Develop improved diagnostics and biosecurity protocols to accurately detect CSSVD in breeding collections, nurseries and farms.
8. Increase open collaboration and partnerships to study gene function of interest.
9. Foster efforts to create new varieties with durable resistance against pest and diseases, which is fundamental for a perennial crop grown by small farmers with low capacity to change their planting material.

E. Thematic Session – Quality, Flavour Sensory Evaluation & Post Harvest

E1. Advances

1. Progress on draft international standards for flavour assessment.
2. Many examples of farmer participatory engagement in flavour quality assessment.
3. Also increased direct working links between chocolatiers and producers.
4. Environmental effects on quality beginning to be appreciated, and "terroir" gaining recognition.
5. Cocoa of Excellence (CoEx) Programme goes from strength to strength.
6. Progress on "molecular fingerprinting" and possible role in traceability.
7. Increased understanding on fermentation chemistry and quality.
8. "Tailored" fermentation developing, not one size fits all.
9. Progress on objective methodologies to complement traditional sensory work.

E2. Perspectives

1. Consider need for wider geographical participation in standards discussions.
2. Include bulk cocoa and fine cocoa sectors?
3. How to assess effectiveness of farmer participation on flavour evaluation?
4. Thinking needed on eventual market destination needed, e.g. fine, bulk, butter/powder, flavonols, etc.
5. Scalability – how to go from niche to country wide implementation?
6. Fermentation science, new tools/technologies helping to improve understanding, opportunities to use technology to monitor/improve quality, and for grading.
7. How to take science/new technologies from the lab, trial, pilot, etc. to the producers, i.e. adoption of cost effective, reliable quality management tools.
8. Quality should be taken into account when conserving genetic resources, and when developing new planting materials to ensure farmers have access to planting materials which can produce cocoa of the quality required by buyers.

E3. Recommendations

1. Engage wider industry on development of standards
2. Develop strategy on linkage(s) to other initiatives (industry quality manual, ISO, certification, ICCO, contracts, etc.)
3. Research to better understand current cost/benefit to farmers of improving quality and which incentives are most effective in improving and sustaining high quality
4. Write up success stories of coop, farmers' group participation on flavour quality implementation.
5. Industry to review farmer training on quality, perhaps less "top-down", more clarity on reasons behind need for quality to meet market requirements, including food safety aspects, and how to achieve it.
6. CoEx – stakeholder discussion on where next, how to develop the brand, and how knowledge of the good practices which result in success can be more widely shared.
7. Industry discussion on fingerprinting/traceability, - needs, reliability, costs, links to paper systems, role in combatting deforestation.
8. Update industry quality manual as new techniques, tools become available and adopted (ECA/Caobisco/FCC).

F. Thematic Session – Agronomy and Crop Systems

F1. Advances

1. Efficient modelling for management (pruning, water).
2. Agronomic systems and particularly agroforestry systems are better known
3. Good characterization of flora and fauna, including nematodes, associated with cacao production system.
4. Demonstrated that different cacao genotypes respond differently to acidic soils, ranging from intolerant to tolerant.
5. Many more insects' families are involved in pollinating cacao than previously reported.
6. Agroforestry systems can diversify farmers' earnings from cocoa production improving sustainability.

F2. Perspectives

1. Need for better tree management, integrated pest and disease control.
2. Need to breed for trees well adapted to environment, using better assimilates and which are more yield efficient.
3. Need for 100% productive trees on the farm; high quality planting materials planted at the recommended planting density.
4. Only 2% of all cacao flowers produced actually produce fruits. Dependent on several factors including incompatibility systems. Better understanding on mixing compatibility systems in cocoa production systems could improve pollination efficiency and as such yields.
5. Soil health and fertility status are major concerns in some areas, and climate change may worsen the situation. There is a need to improve soil management practices, and develop ways to reclaim degraded soils. There is scope however, to develop planting materials that are more tolerant of sub-optimal soil conditions to help mitigate the problem.
6. Microbiome of cacao production system is quite complex which may be best supported by an agroforestry system. Trade-off is lower yields in cocoa as well as higher tree management cost.

F3. Recommendations

1. More work needed on response of cacao genotypes to acid soils and resilience to aluminium toxicity?
2. Determine where cocoa plantations are suitable in the future
3. Need for 100% productive trees on the farm.
4. More research in physiology needed.
5. Improving agroforestry systems (what species to associate with cocoa and designs).

G. Thematic Session – Cadmium and Food Contaminants

G1. Advances

1. Great progress in mapping soil cadmium levels in various countries in Latin America and Caribbean region (LAC). Countries in various stages of completion.
2. Advances in understanding pathways to cadmium contamination of cocoa beans namely, soil factors influencing cadmium availability to the plant, genotypic effects and anthropological sources.
3. Agreement on methods of assessing total and available cadmium in soils and total cadmium in beans, and on the instrumentation to be used.

4. Advances in mitigation investigated at laboratory, greenhouse and field levels in a project sponsored by ECA/CAOBISCO/FCC and others - modifying pH, addition of biochar, vermi-compost, soil microorganisms to improve soil fixation and immobilization of cadmium, blocking of transporters, grafting varieties onto low cadmium bio-accumulating rootstocks.
5. Some understanding on how various cropping systems contribute or alleviate the cadmium contamination of cocoa beans. Could be used to develop integrated system for the management of cadmium levels in cocoa beans.

G2. Perspectives

1. In LAC, contamination of cadmium is the most important food safety issue with the new EU regulations coming into effect in January 2019. General agreement regarding maximum allowable limits for cadmium also being develop by *Codex Alimentarius*. These will have significant effect on LAC particularly in rural sector due to loss of market access.
2. Identifying the problem areas in a country, understanding the source of cadmium in each area and developing specific and general strategies to address these problems remains trailing behind.
3. Promising investigation in lab, greenhouse and field have to be validated under various soil types and conditions.
4. Ochratoxins, mineral oil hydrocarbons, mercury and aluminium in cocoa beans are also emerging issues in food safety but limited attention being paid given the enormity of the cadmium issue.
5. Pesticide residues also continue to be an issue in some markets.
6. Food safety in the various quality assessment procedures being developed, particularly at the farmer levels was also identified as an issue.
7. The major cocoa producing countries in the LAC remain in various levels of progression.

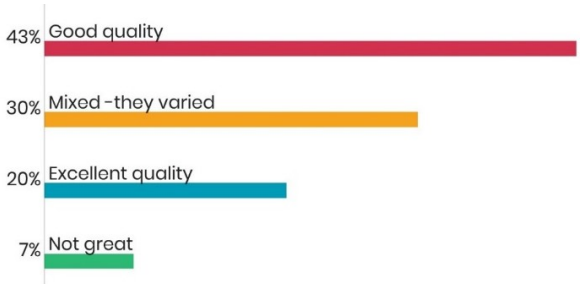
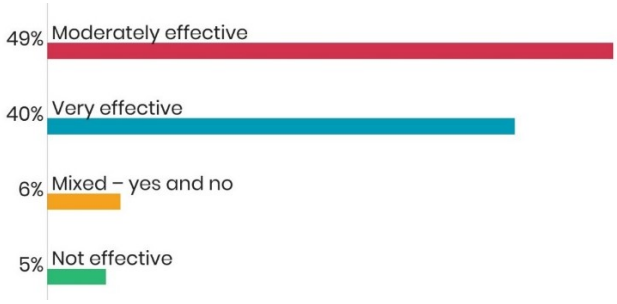
G3. Recommendations

1. Greater coordination across countries to share best practices and knowledge on cadmium mitigation (including checking fertilisers for cadmium levels) must be pursued.
2. More studies are required to understand the correlation between levels in soil, leaves and bean
3. A more nuanced approach to managing cadmium in different soil types should be possible after validation of the emerging methods in different countries.
4. The genetic strategy (grafting) is a viable option but needs to be validated in a range of soil types and cadmium levels. More research to find genotypes with good agronomic characteristics and which accumulate low levels of cadmium is needed.
5. Greater funding must be generated and better coordinated to implement these practices particularly in countries that are lagging behind. A workshop bringing all the development agencies, NGOs and research organizations is important.
6. LAC institutes to continue to provide input into the development of an STDF project proposal (lead by ICCO and CABI) to coordinate, share information across countries and validate the results in various agro-ecologies.
7. Some level of mediation to extend the stipulated deadline for cadmium level by EU should be pursued given the advances in research being made.
8. The differences in the risk assessments for cadmium consumption from cocoa products used by JECFA and EFSA, and their implications for setting maximum levels, were raised.

Next steps:

1) Post-ISCR evaluation survey - online
2) Upload all oral presentations at PDF files on the ISCR website by 15th December
3) Thematic sessions - brief reports to all – by 30 November
4) Posters – PDF files - deadline for submission – 15th December
5) Full papers submission - deadline – 15th December
6) ISCR 2017 Proceedings – 30 March 2018
7) World Cocoa Conference 4 – Berlin, Germany, 22-25 April – ISCR 2017 report
8) Next ISCR – dates and venue to be determined

Quick Evaluation Survey

1) How satisfied are you with your overall experience at the ISCR 2017? Replies: 145	2) **What was the overall quality of the oral presentations?** Replies: 138
	
3) How effective networking was ISCR 2017? Replies: 108	**4) Have you heard advances in research that will enhance profitability of cocoa farming?** Replies: 126
	

VIEW POINT OF YOUNG SCIENTIST on the ISCR

- Good experience and glad to meet other young and not so young scientists at this meeting. Want to encourage more collaborative work.
- Good to be exposed to areas beyond my area of specialty and meet potential collaborators and learn how to make my work relevant to producers.
- Glad for networking opportunity. Cocoa has a future ahead and we can think out of the box on how to help farmers make it sustainable.
- My first international meeting in cacao and I'm glad to learn about what is going on in other countries. But I want to see more benefits for farmers. We need the resources and funding to make our ideas a reality for farmers.
- I've been in cacao genetics research for 5 years and this is my first International Cacao Symposium. It was refreshing not to hear about the politics as in other local or regional meetings. As researchers we need to collaborate. I want to see greater collaboration within Peru but also externally.
- I completed my graduate studies 2 years ago. This is my first International Cacao Symposium. I'm impressed with the amount of research ongoing in cocoa that was shared amongst scientists but now what? How do we get this information to the farmers? We must consider that nothing in this chain can happen without the farmers so we must keep them in mind.
- I believe cacao has a real potential, this event was very enriching and I'm grateful to the organizers.
- I'm from Indonesia so I'm really glad to network with everyone from all over the world. It's good to avoid duplication of research, share information and we can work to help farmers by finding solutions to their problem.
- I come from a cocoa farm from Ecuador and I have completed my PhD. We generate much research as scientists which many times remain on the shelf and does not get to the farmers. Why is the price of cocoa so low for such hard work? Research could be on how to generate better prices for cocoa.