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To: Cocoa Research Sub-Committee

From: Michelle End

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**CFC Workshop on Cocoa Germplasm Utilisation and Conservation:
A Global Approach**

Please find attached for your information a report from Prof. Hadley and his colleagues at Reading on the CFC Workshop held 1st-7th February in Montpellier. There will be an opportunity to discuss this at our meeting on 18th March.

**Workshop of the CFC/ICCO/IPGRI Project on
"Cocoa Germplasm Utilisation and Conservation: A Global Approach"
1-7th February 1998 Montpellier, France**

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The University of Reading is participating in three components of the CFC/ICCO/IPGRI Project on "Cocoa Germplasm Utilisation and Conservation: A Global Approach", each kindly supported by co-financing and/or counterpart funding from BCCCA/LIFFE:

Multiplication and Distribution of Germplasm (PH, AP, MJE)
Witches' Broom Resistance Screening Ring Test (MWS, AD, AP)
Information Exchange/Clonal Identification (MJE, CSF, MJW)

The inaugural workshop for the project was held in Montpellier to allow participating institutions to agree on the detailed methodologies to be adopted for each of the research activities. The Workshop consisted of concurrent sessions for Breeding, Pathology and Entomology working groups together with plenary sessions for general discussions. We had been invited to make presentations on our respective research activities and lead discussions to establish the methodologies to be used. Furthermore, the workshop provided an opportunity to meet both researchers involved in the project and CIRAD scientists with research interests similar to our own. We understand that the procedures agreed upon at the Workshop will be published in the near future. In this report, we therefore describe our inputs to the Workshop in more general terms, focusing on the contacts made and important issues raised rather than detailing the methodologies agreed upon. These can be made available in draft form if required.

International Clone Trial - Physiological Measurements (P Hadley)

Although physiological evaluation of clones is not included in the project as a specific research activity, PH had been invited to present a paper on physiological measurements that could be adopted as part of the CFC International clone trial. PH presented a simple flow diagram to indicate factors that determine the rate of dry matter accumulation and partitioning to the yield components in the cocoa tree. He then suggested methods that could be used to quantify dry matter production and partitioning. These included non-destructive measurements of dry matter accumulation and harvest increment, measurement of canopy size and architecture, measurement of canopy light interception and also modern approaches to the measurement of photosynthetic rate and canopy nitrogen content. He also explained the value of such measurements in indicating the causes of yield variation that is likely to occur amongst genotypes used in the study.

Many of these measurements were rather laborious or, where equipment was available to carry out measurements simply, this was often prohibitively expensive to be included in the project. However, it was agreed that simple protocols would be developed that could be used by participants if there was time for such measurements to be carried out.

Multiplication and Distribution of Germplasm (P. Hadley, A. Parker, M.J. End)

The workshop provided the opportunity for the distribution of budwood for the clonal trial from the Reading and Montpellier quarantine facilities. AP and AD had prepared the budwood on 5th February and had carried the packages as hand luggage for distribution to the delegates at the end of the workshop on the 6th February. Budwood from 16 clones was distributed to each of the eight participating institutions which did not already have the clones, or chose to re-introduce the clones where the identification of their material was in doubt. This gave a total of 81 samples each of 2-3 budsticks from the Reading facility. A number of delegates had expressed concern about the possibility of virus transmission and had asked for clarification on the virus testing procedures at the Reading and Montpellier facilities. Several Latin American countries would not accept material from the CIRAD collection which had passed through West Africa at any time and had not been virus indexed. PH and MJE met with staff from the CIRAD facility to discuss how they might introduce a virus indexing procedure similar to that in force at Reading. During the final plenary session, MJE made a short presentation on the quarantine operation at Reading, including an outline of the virus indexing procedure used and mention of the importance of post-entry quarantine. Copies of the guidelines for the safe-handling of germplasm prepared by Reading were distributed with the budwood.

Witches' Broom Resistance Screening (M.W. Shaw, A. Davies, A. Parker)

MWS attended all the discussions on witches' broom in the Pathology group and plenary session, contributing substantially to them both by chairing and by presenting the proposed work at Reading. MWS, AD and AP were also able to meet the pathologists who will provide the material from which spores will be isolated for the work, and establish the personal contact which will enable effective co-operation. MWS chaired the session which established the willingness of Venezuela and Trinidad to adopt the screening system for seedlings developed in Florida and Brazil, so that all four centres will be producing test results which could be comparable.

Discussions with Dr duCamp (CIRAD) and Dr Butler (CRU, Trinidad) were particularly helpful in establishing the limitations and scope of the rapid leaf test partly developed by Dr duCamp which is currently being evaluated at CRU and Reading. Both CRU and Reading have not found this test to be reliable and Dr. duCamp had suggested that leaf condition was a critical factor. Dr duCamp showed MWS, AP and AD the stage of leaf development suitable for the test, and leaves which he had treated. However, it was clear from this material and discussions with Dr Butler that the test gave

extremely erratic results whoever did it. Further work to establish whether or not this technique can be developed to a stage where it is useful for screening is needed and this will be carried out during Year 1 of the project at Reading. Agreement was also gained within the pathology group for MWS's procedure to develop a microscope based leaf test and a bud infection test which can be used for the witches broom screening ring test.

Information Exchange (M.J. End, C.S. Ford, P. Hadley)

CSF made a presentation to the Breeding group on the production of datasheets for clones included in the "international clone trial" using data from the ICGD. It was agreed that the information could be arranged on two sheets detailing "general evaluation" data and more detailed characterisation data for the identification of the clones. The sheets are to be distributed once the genetic fingerprinting of material is complete and the identity of the local and quarantine material has been verified. It is intended that evaluation data from the trials and disease screening activities will be added to these sheets as the information becomes available and the sheets will be re-distributed to the participating institutions. The ICGD will also to be used to produce a list of "most widely used" clones. Once the list of 50-70 clones has been agreed, datasheets for these clones will also be produced and distributed. It is intended that towards the end of the project, datasheets on the clones involved in the international clone trial, "most widely used" clones, and the "core collection" will be collated into a publication which will be complementary to any ICGD publications.

MJE made a presentation on the role of the ICGD in the project in the plenary session. She described the status of the project, including the recent release of the Second Printed Version of the ICGD, and the current development of a "MS Windows" version and web site. MJE invited participants to provide the ICGD with feedback on the computing hardware and software available at their institutions and their preferences for the future development of the ICGD. She also outlined the type of data which would be valuable to the ICGD and the best format to use when supplying it. MJE ended the presentation with a list of suggestions for ways to improve the flow of information into the ICGD.

The opportunity was taken to distribute fourteen copies of the new printed version of the ICGD to the participating institutions. It appeared that this was well received and a number of recipients commented that they found the format of the books useful and the information of great value. In discussions with MJE and CSF, the delegates from CEPLAC (Brazil), EET Pichilingue (Ecuador), CCRI (Papua New Guinea) and FONAIAP (Venezuela) said that they intended to provide the ICGD with new characterisation and evaluation data on their material in the near future.

A brief meeting took place with Drs. Claire Lanaud, Pierre Lagoda and the ICGD/BCCCA personnel to discuss collaboration between the ICGD and the CIRAD molecular database TropGene. There was general agreement that it would be useful to develop a means to access data from both databases transparently whilst giving due acknowledgement to both contributors to the

respective projects and sponsoring organisations. One way to do this may be via a linked website and Dr. Engels of IPGRI provided MJE and CSF with some contacts who are gaining experience in this area through the development of websites for other crop/germplasm databases. MJE and CSF were able to meet with Dr. Lagoda and Mr. Raboin, the database developer, for more technical discussions and a demonstration of the TropGene database. It is an impressive system constructed using ACE-DB, a form of "hypertext" software, enabling the user to quickly find information on a clone or gene. There had been plans to release TropGene as a CD-ROM or Web version but it seems that this will be delayed since there is no further funding for the project and Mr. Raboin will be working on another crop away from Montpellier. MJE and CSF agreed to further investigate the potential of ACE-DB for the management of the ICGD. Since it appears that dBase type database management systems still have some advantages, the best way forward may be to find ways to integrate the two systems using compatible software.

Clonal Identification (M.J. Wilkinson)

A presentation was made by MJW to the Breeding subgroup of the workshop on the value of genetic fingerprinting techniques in genotype verification for the multisite trials. Given the importance of ensuring that material used by collaborators is correctly labelled, it was recommended that two independent tests be performed on all trial material. Ideally, these tests should be conducted in different sites and be based on molecular analyses which operate on different principles. It was concluded that Reading should perform ISSR-PCR (anchored microsatellite technique) and CIRAD perform SSR-PCR (standard microsatellite technique) on identical material sent initially to CIRAD and subsequently forwarded to Reading. In this way, the chances of errors are minimised and the scope for distinguishing closely related genotypes is maximised. This recommendation received support from those present and it is planned that testing will proceed in the coming months.

At the same time, MJW was able to establish two important contacts: Dr Claire Lanaud and Dr Orjeda. Meetings with both of these scientists were productive. Dr Lanaud and MJW agreed to investigate the possibility of seeking EU funding for a cocoa project involving CIRAD, Trinidad (Dr Sounigo) and Venezuela. A first draft of a concept note for this work has already been sent to Dr Lanaud. Dr Orjeda expressed interest in establishing a collaborative link to work on another crop (banana). Much of the suggested subject area would have direct relevance to the cocoa work at Reading and would complement research efforts in this field. A proposal is planned within 9 months.

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