

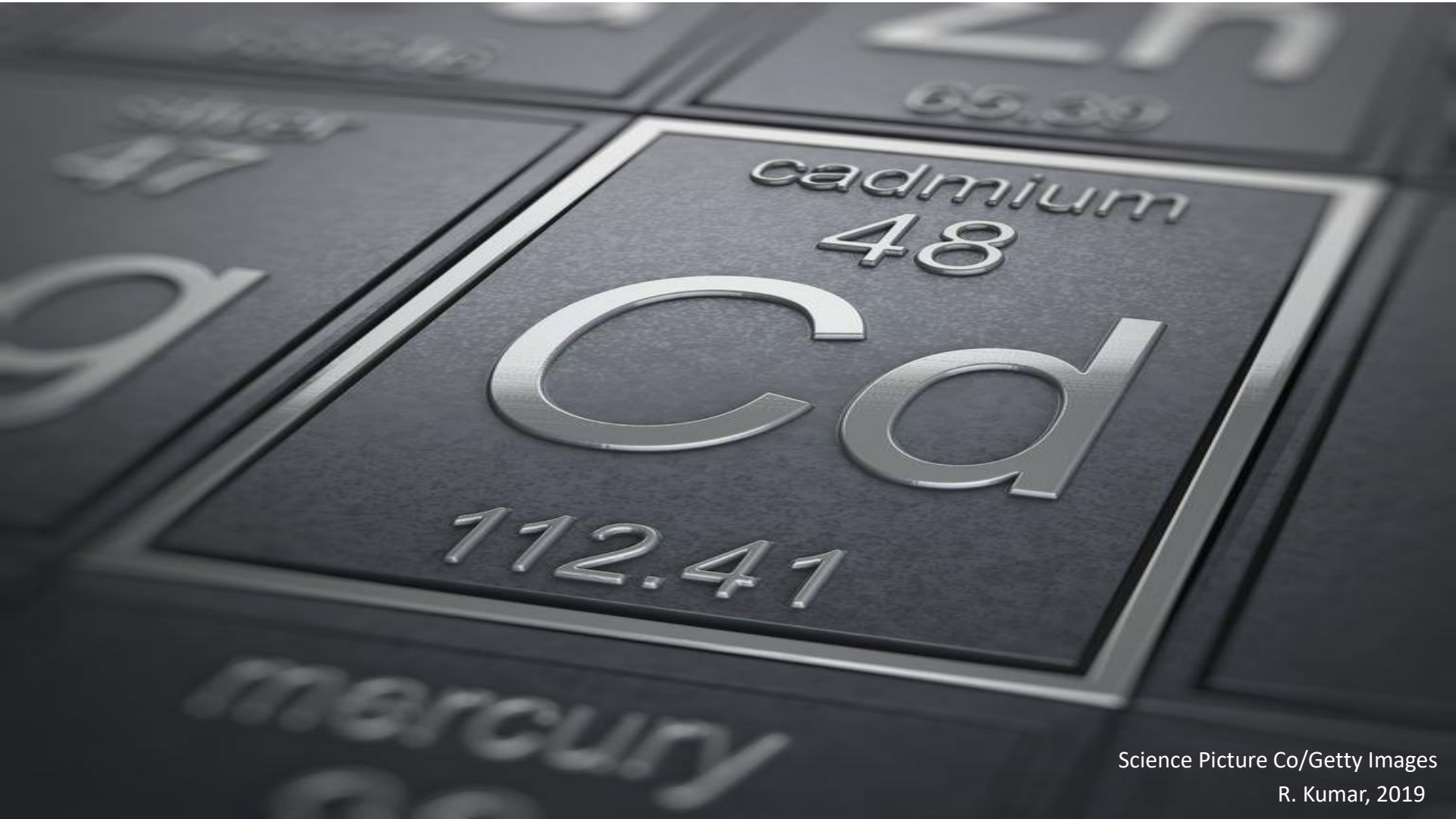
Mitigation of Cadmium Bioaccumulation in Cacao through Soil Remediation



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**2017 International Symposium on Cocoa Research (ISCR),
Lima, Peru, 13-17 November 2017**

Cacao and Cadmium



EU Maximum Limits for Cadmium in Cocoa Products to be applicable from 1st January 2019 (commission Regulation (EU) No 488/2014 amending Regulation (EC) No 1881/2006).

Specific cocoa and chocolate products as listed below -

Milk chocolate with <30% total dry cocoa solids	0.10mg/kg as from 1 Jan 2019
Chocolate with <50% total dry cocoa solids; milk chocolate with \geq 30% total dry cocoa solids	0.30mg/kg as from 1 Jan 2019
Chocolate with \geq 50% total dry cocoa solids	0.80mg/kg as from 1 Jan 2019
Cocoa powder sold to the final consumer or as an ingredient in sweetened cocoa powder sold to the final consumer (drinking chocolate)	0.60mg/kg as from 1 Jan 2019

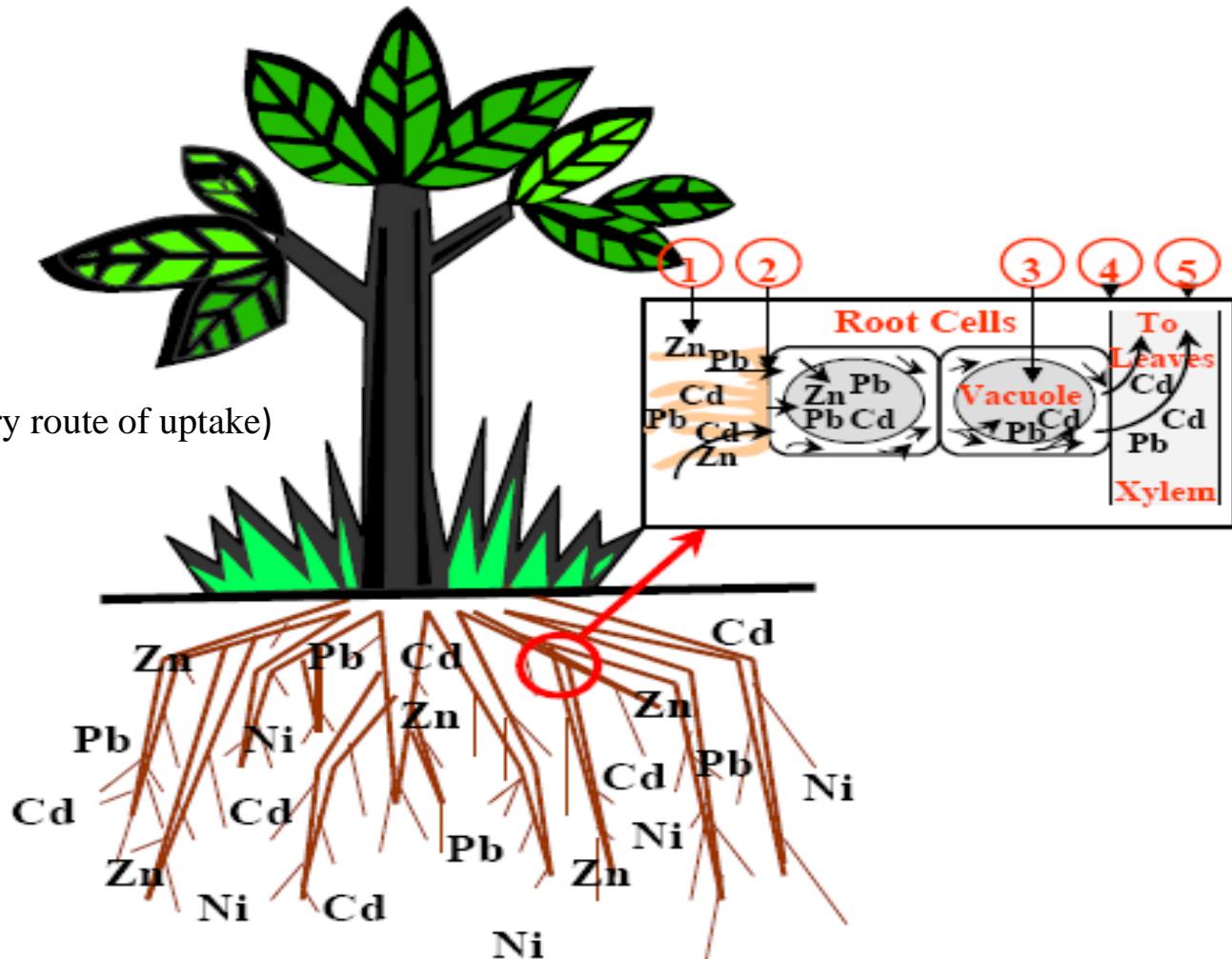
*For the specific cocoa and chocolate products the definitions set out in points A. 2, 3 and 4 of Annex I to Directive 2000/36/EC of the European Parliament and of the Council of 23 June 2000 relating to cocoa and chocolate products intended for human consumption (OJ L 197, 3.8.2000, p. 19) apply



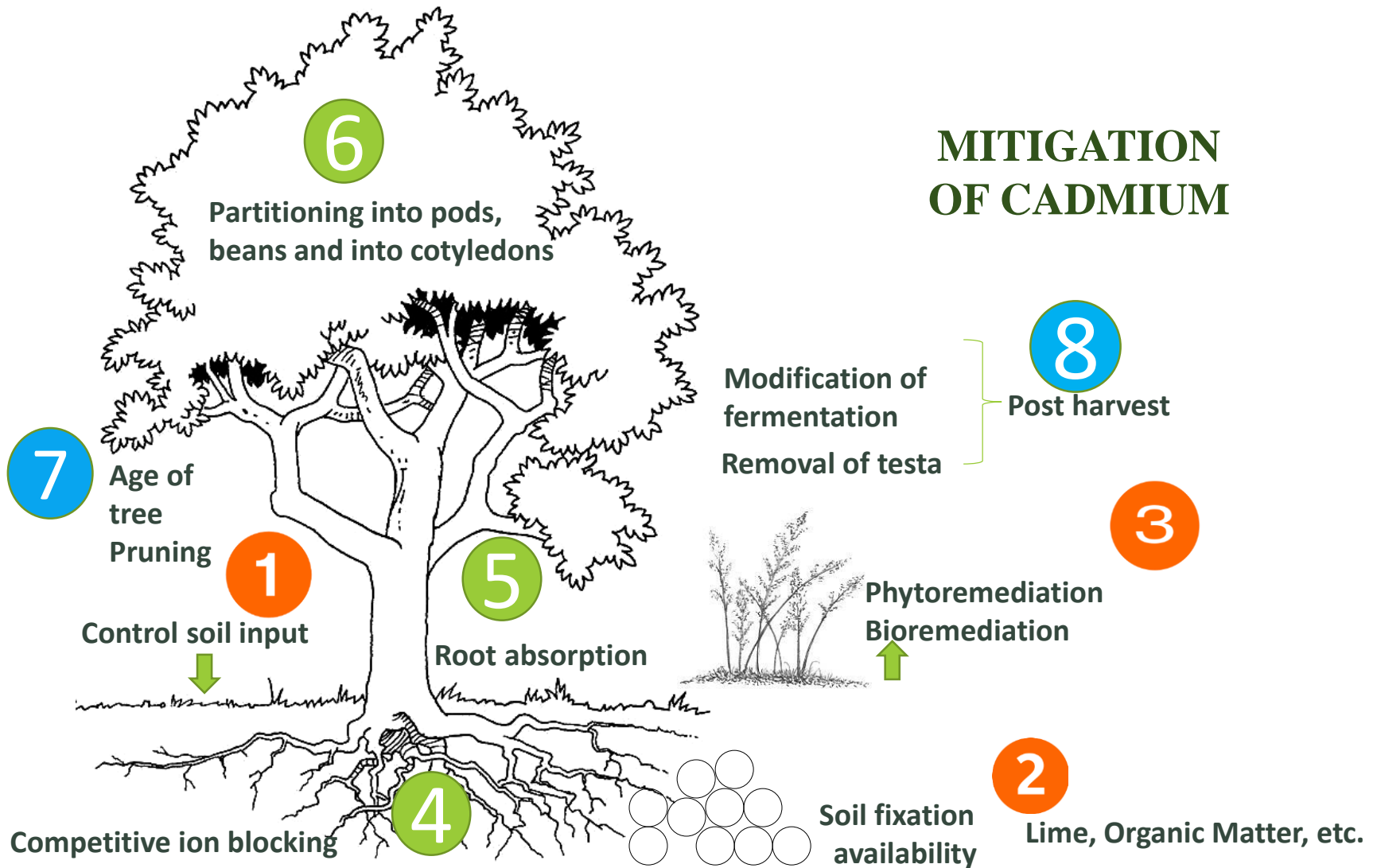
WHAT DO WE
KNOW?

Cadmium (Cd) absorption and accumulation in plants

Root uptake (Primary route of uptake)



MITIGATION OF CADMIUM



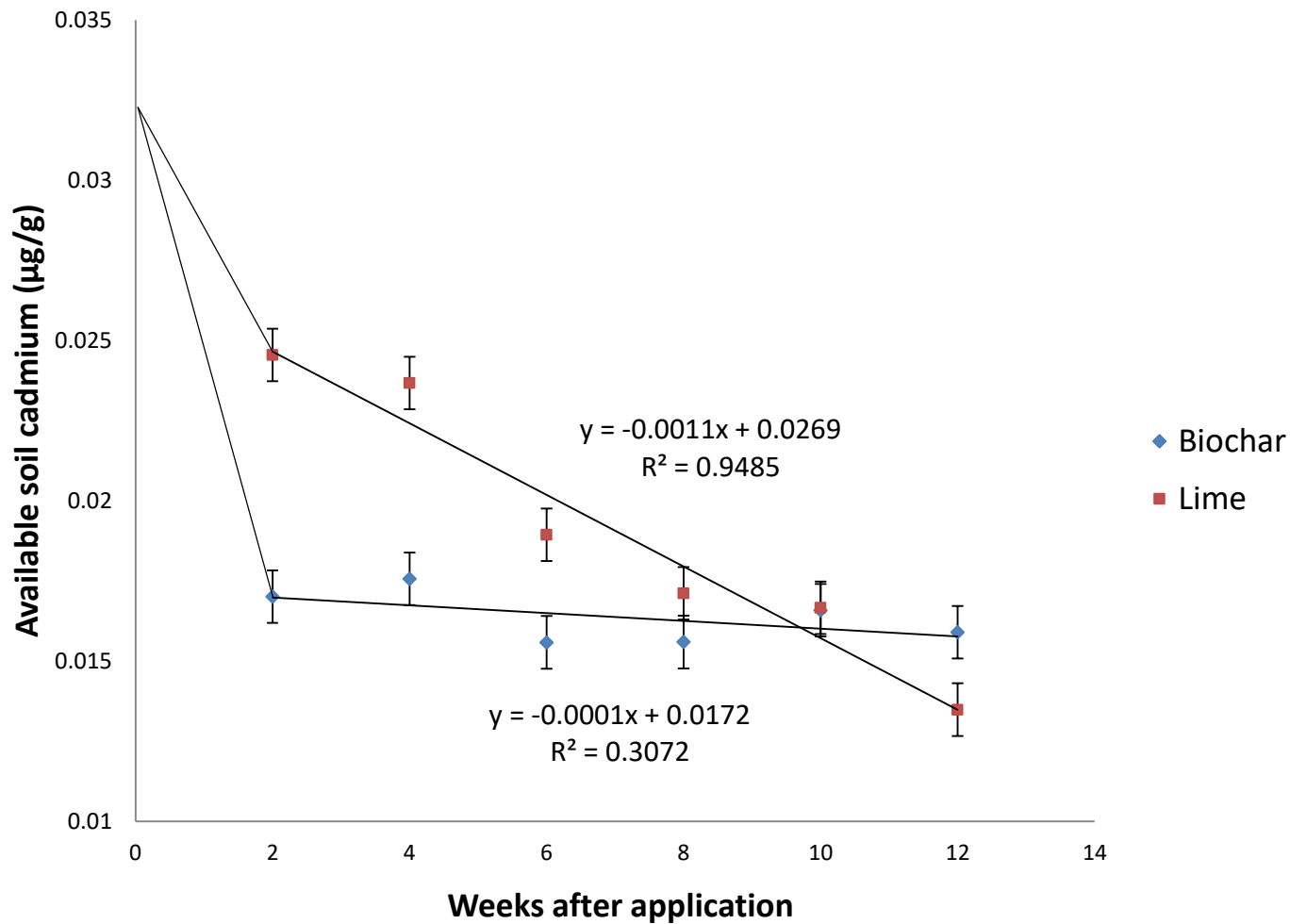


Laboratory Soil Incubation Study

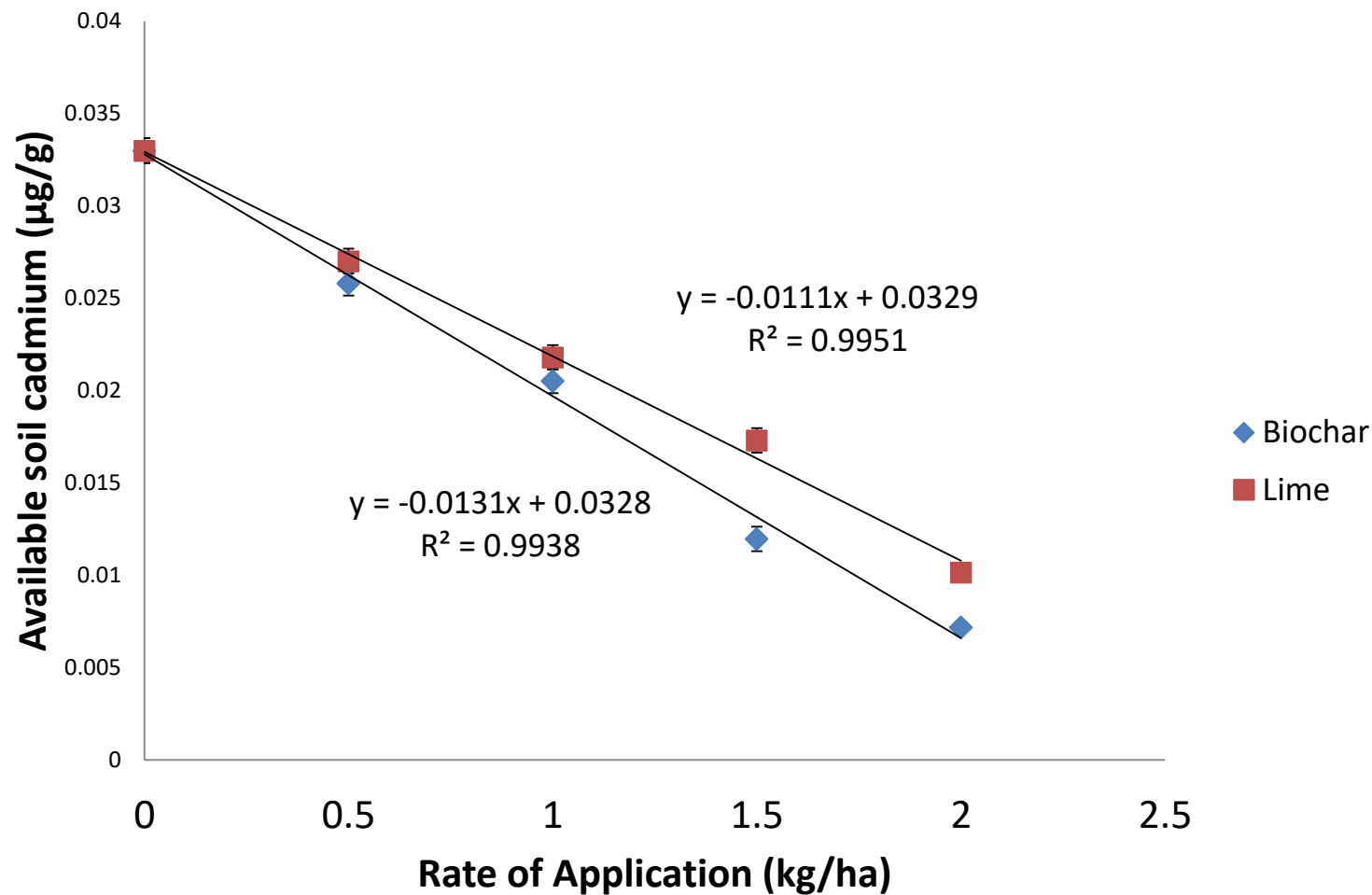
Greenhouse Study

Results

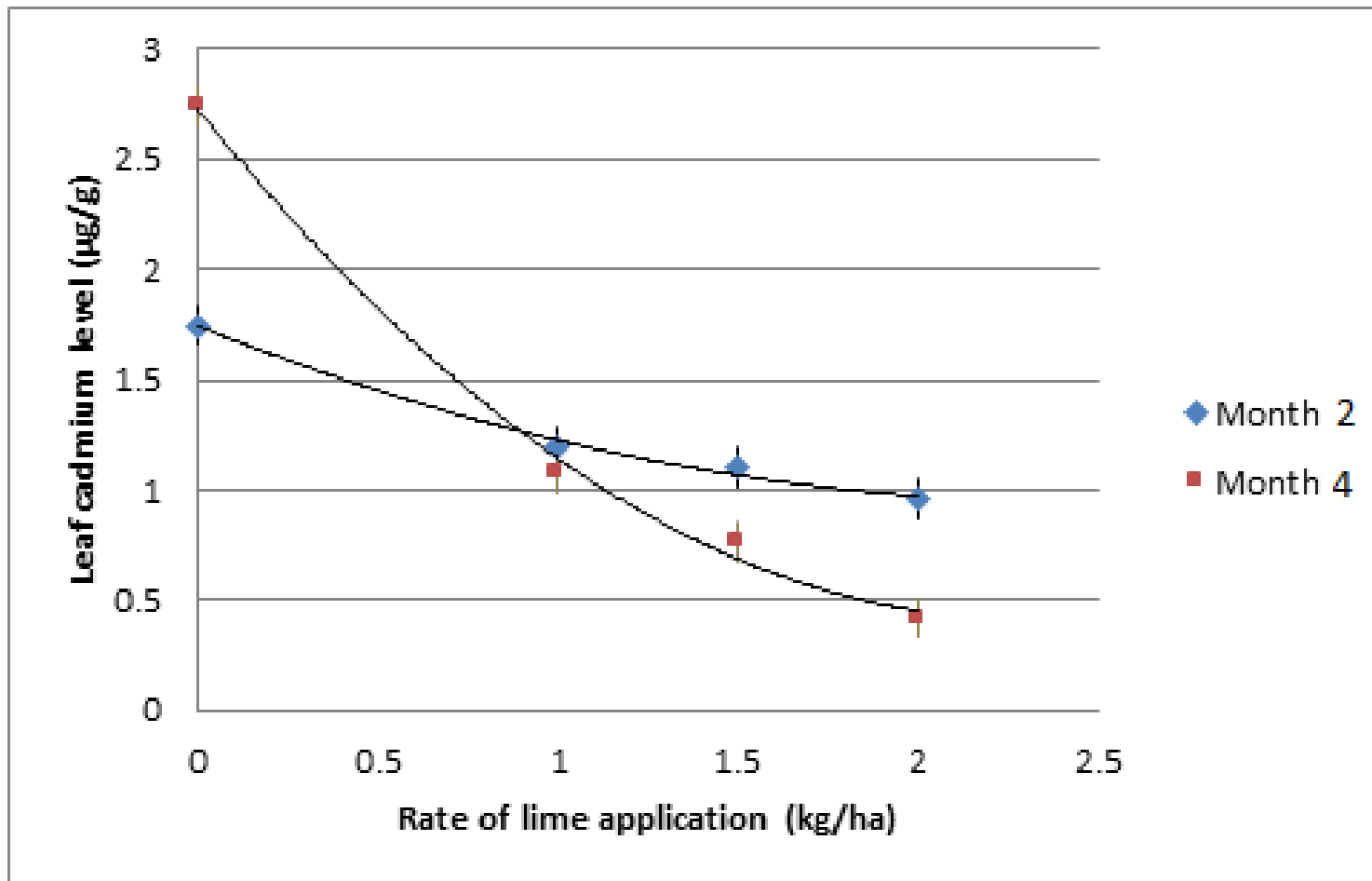
Study-1 -Laboratory soil incubation studies: The effect of biochar and lime on available soil Cd



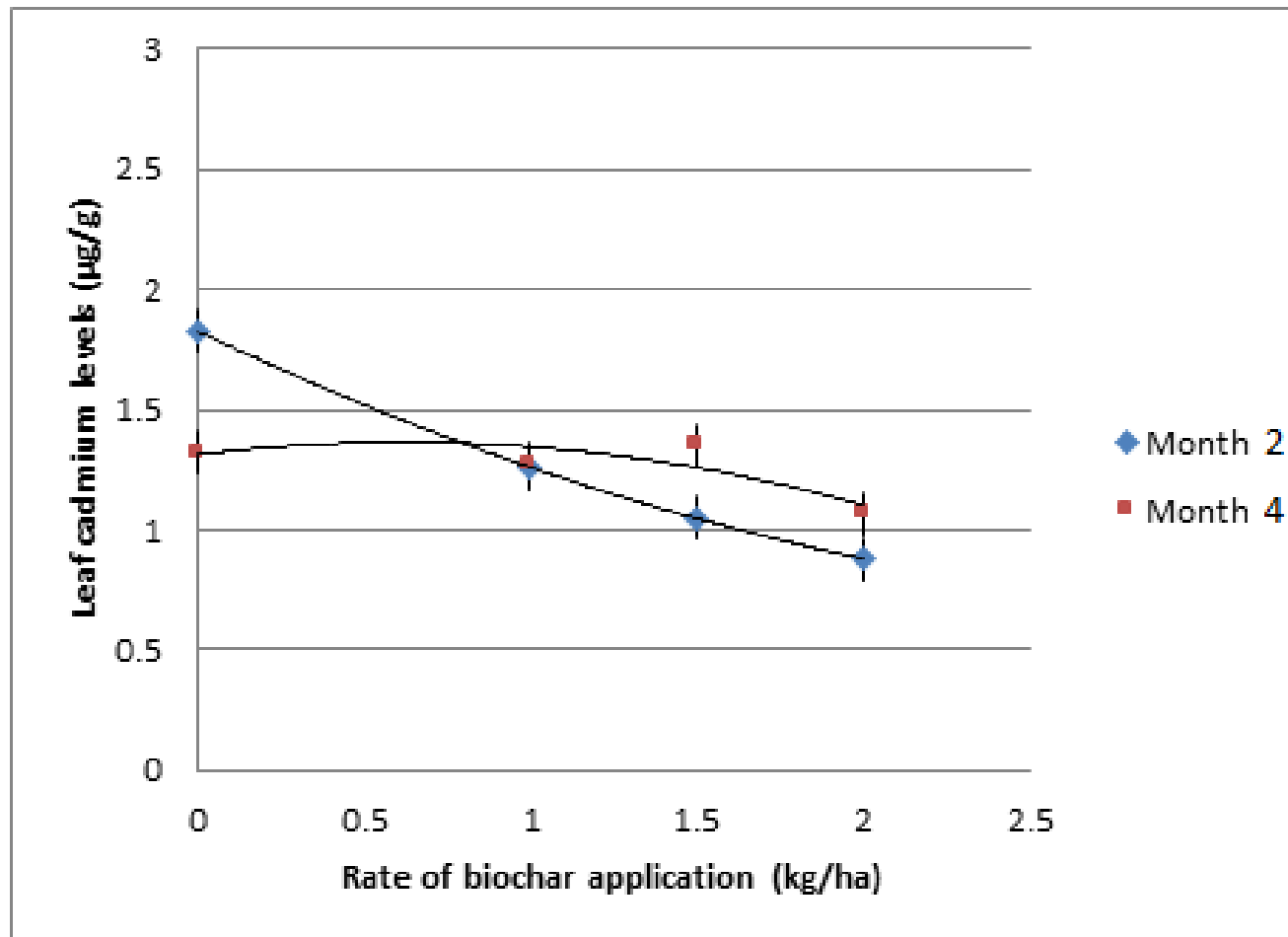
Study-1 -Laboratory soil incubation studies: The effect of rate of application of biochar and lime on available soil Cd



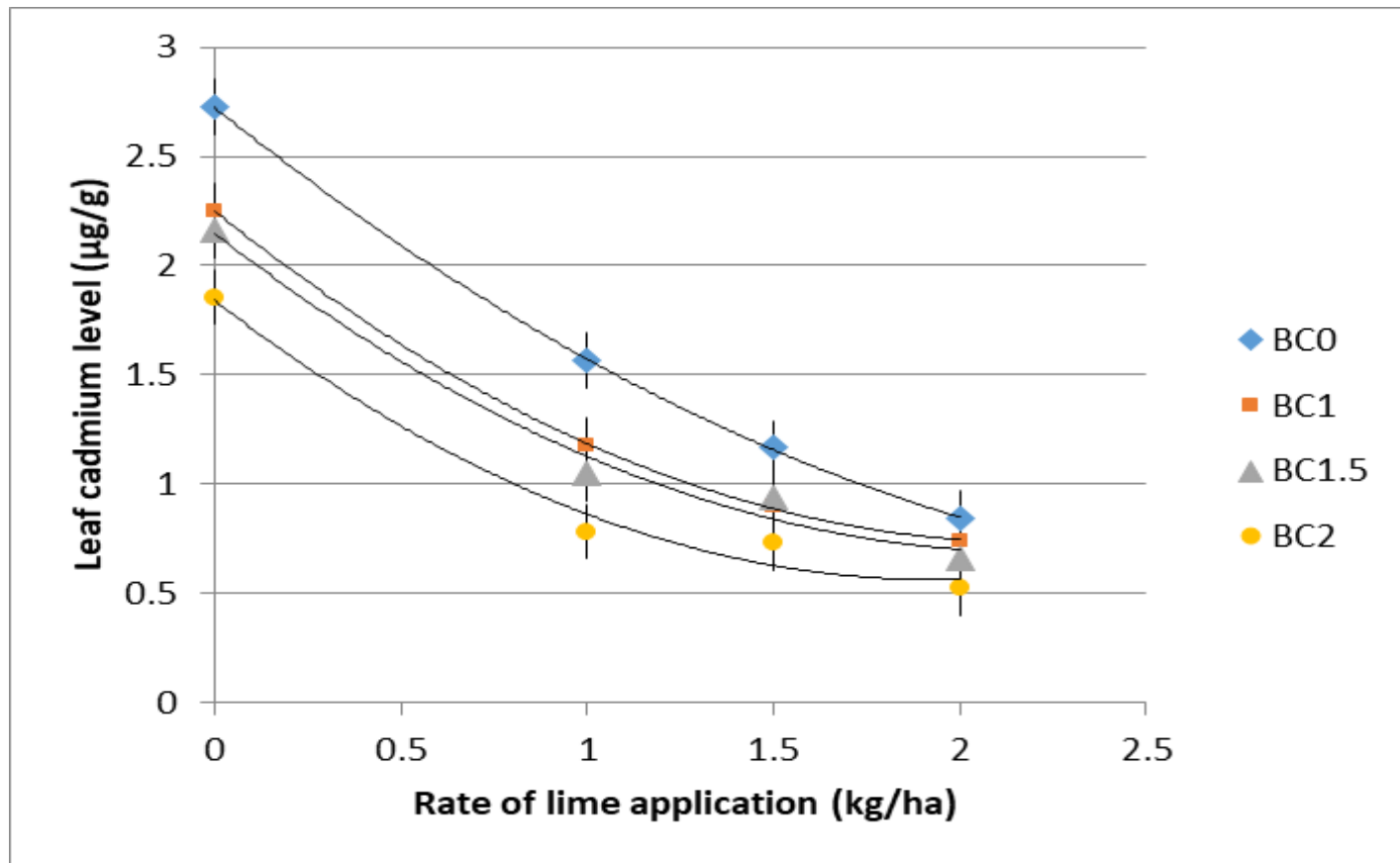
Study-2 -Greenhouse studies – Effect of application rates of lime on leaf Cd levels in *T. cacao*



Study-2 -Greenhouse studies – Effect of application rates of biochar on leaf Cd levels in *T. cacao*



Study-2 -Greenhouse studies – Effect of application rates of combined lime and biochar on leaf Cd levels in *T. cacao*.



Summary of Results

Laboratory and Greenhouse Trials:

1. Biochar and Lime both effective in reducing **bioavailable Cd in the soil.**
2. Biochar and lime both effective in reducing **leaf cadmium concentrations.**
3. Effectiveness of reduction of Cd in soil and leaves **increased with rate of application** of ameliorants.
4. Effectiveness of reduction of Cd in soil and leaves **increased with combination** of ameliorants.

Where do we go from here?



Acknowledgements



Project sponsors:

- Association of the Chocolate, Biscuits and Confectionery of Europe (**CAOBISCO**)
- European Cocoa Association (**ECA**)
- Federation of Cocoa Commerce (**FCC**)

Supervisor: Prof. Pathmanathan Umaharan

Staff of Cocoa Research Centre (**CRC**), UWI



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