



# CO2FIX – Stand-level carbon simulator

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Ecological Modelling 164 (2003) 177–199

[www.elsevier.com/locate/ecolmodel](http://www.elsevier.com/locate/ecolmodel)

ECOLOGICAL  
MODELLING

## Coffee-agroforestry in Costa Rica



Canopy layer: *Cordia alliodora*  
Service tree: *Erythrina poeppigiana*  
Cash crop = *Coffea arabica*

### Modeling carbon sequestration in afforestation, agroforestry and forest management projects: the CO2FIX V.2 approach

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J. Liski<sup>c,2</sup>, G.J. Nabuurs<sup>d</sup>, A. Pussinen<sup>c</sup>, B.H.J. de Jong<sup>e</sup>, G.M.J. Mohren<sup>f</sup>

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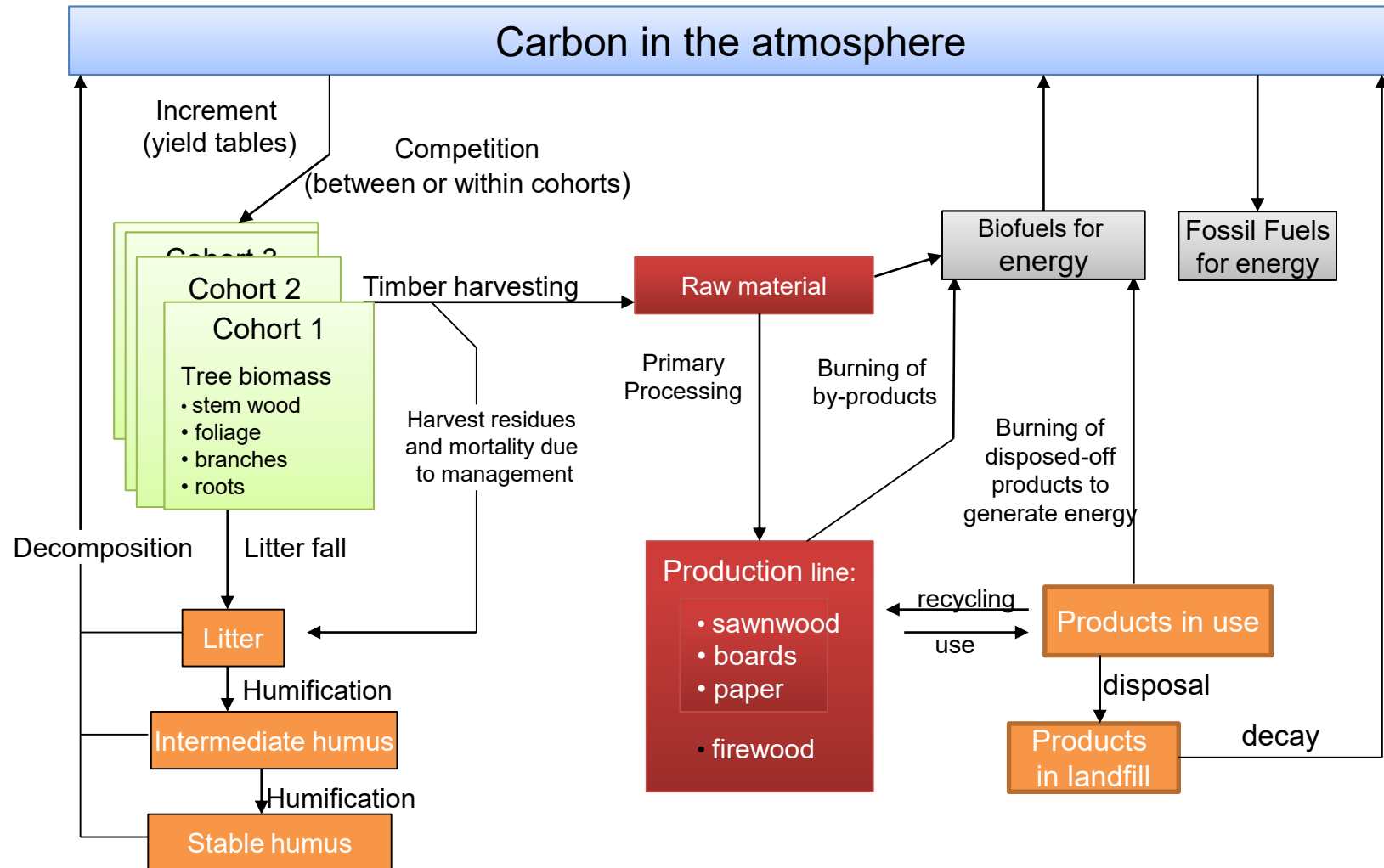
<sup>f</sup> Forest Ecology and Forest Management Group, Department of Environmental Sciences, Wageningen University,  
P.O. Box 342, 6700 AH Wageningen, The Netherlands

<sup>g</sup> Finnish Forest Research Institute, P.O. Box 68, FIN 80101 Joensuu, Finland

The most commonly used patch-scale  
C-simulator globally

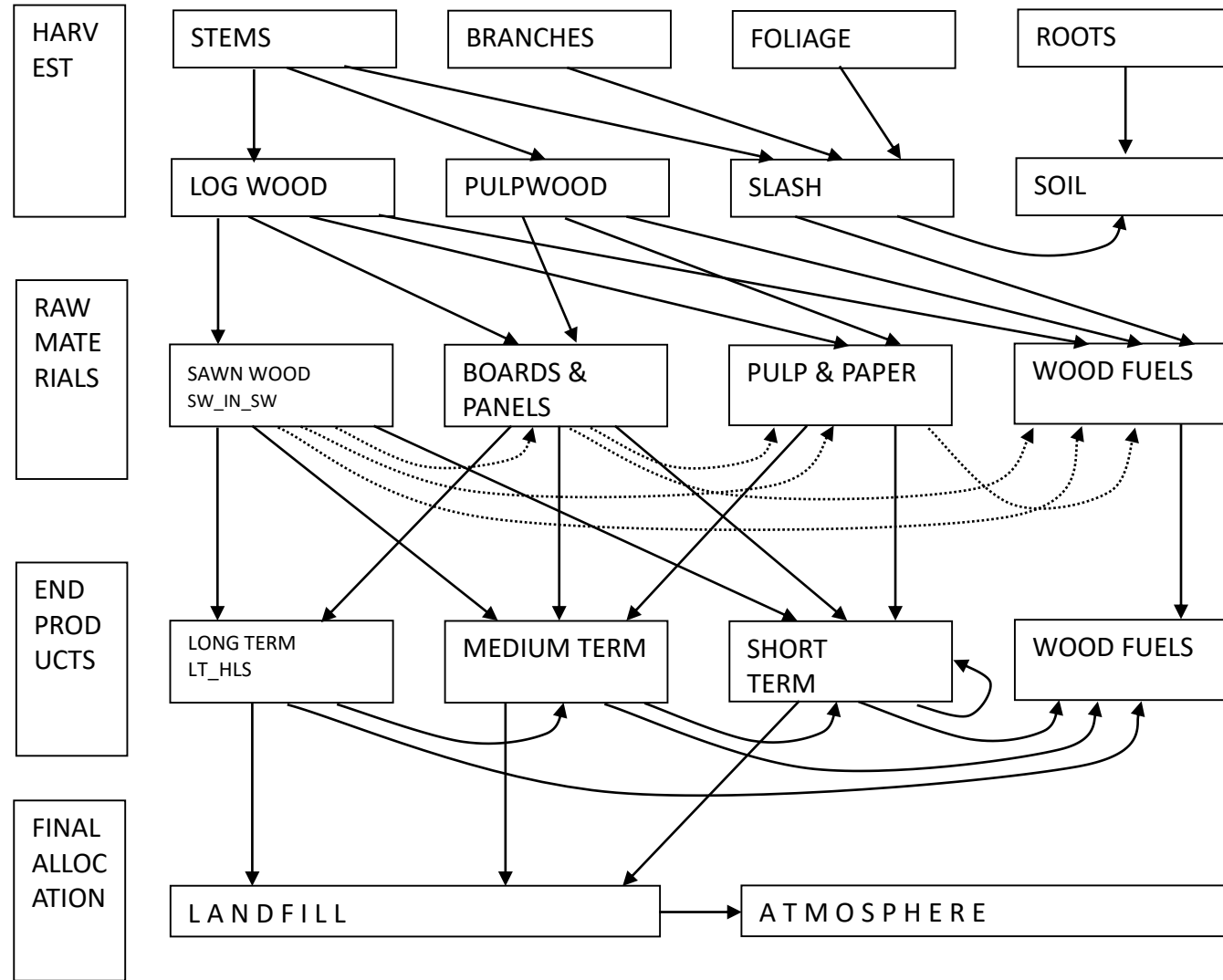
<http://dataservices.efi.int/casfor/models.htm>

# CO2FIX: model structure

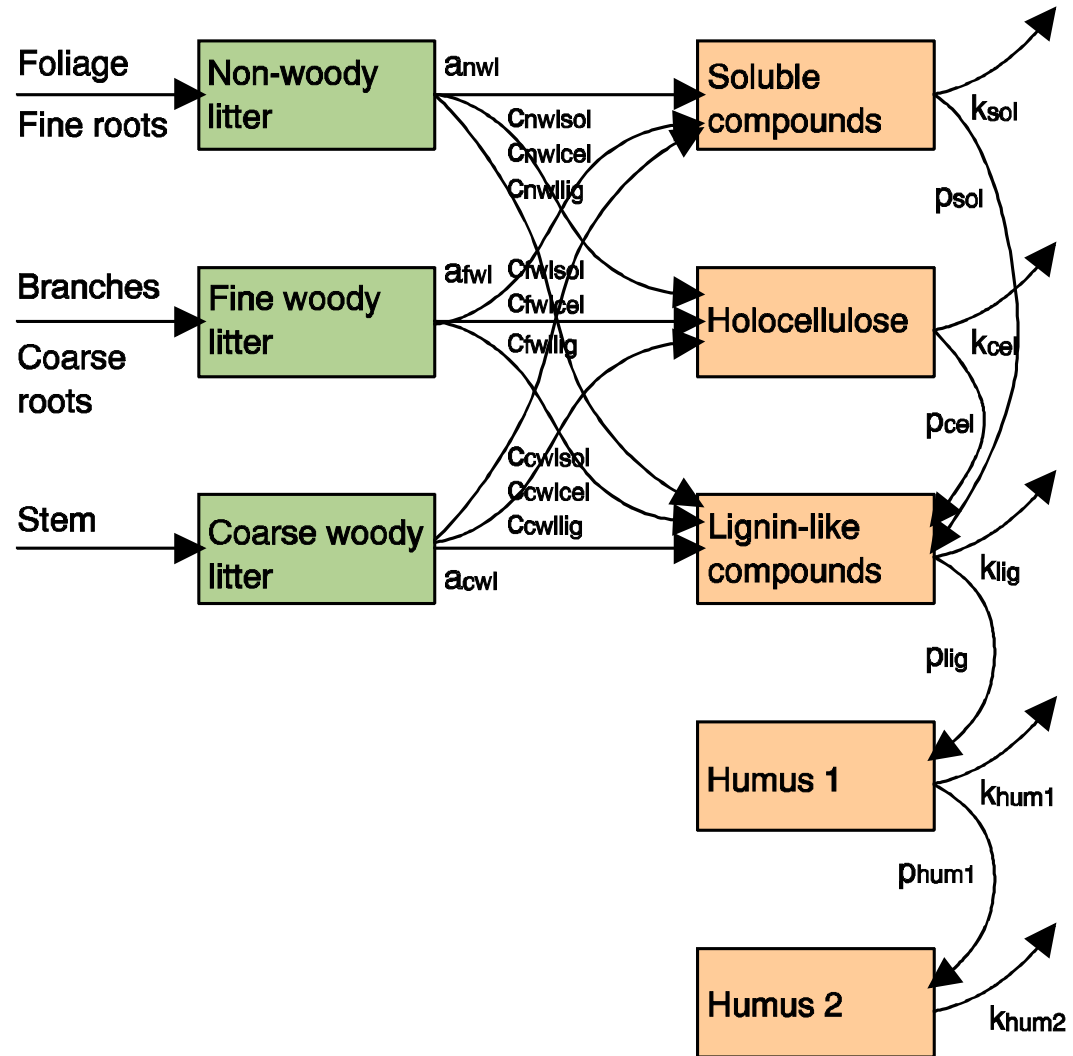




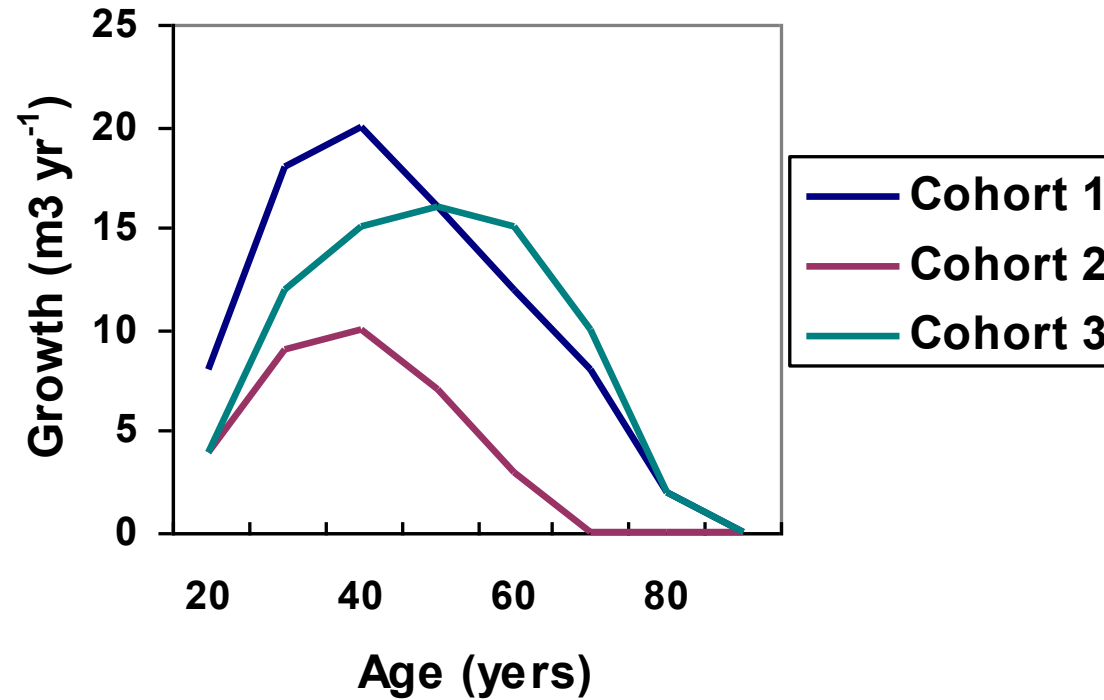
# CO2FIX: products module



# CO2FIX: soil module



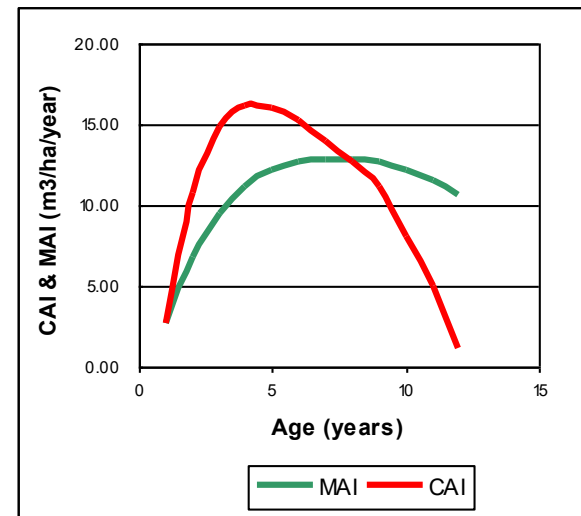
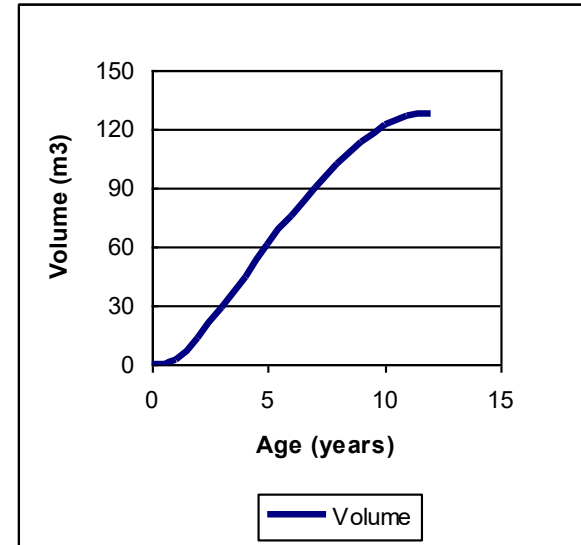
# Growth as a function of tree size





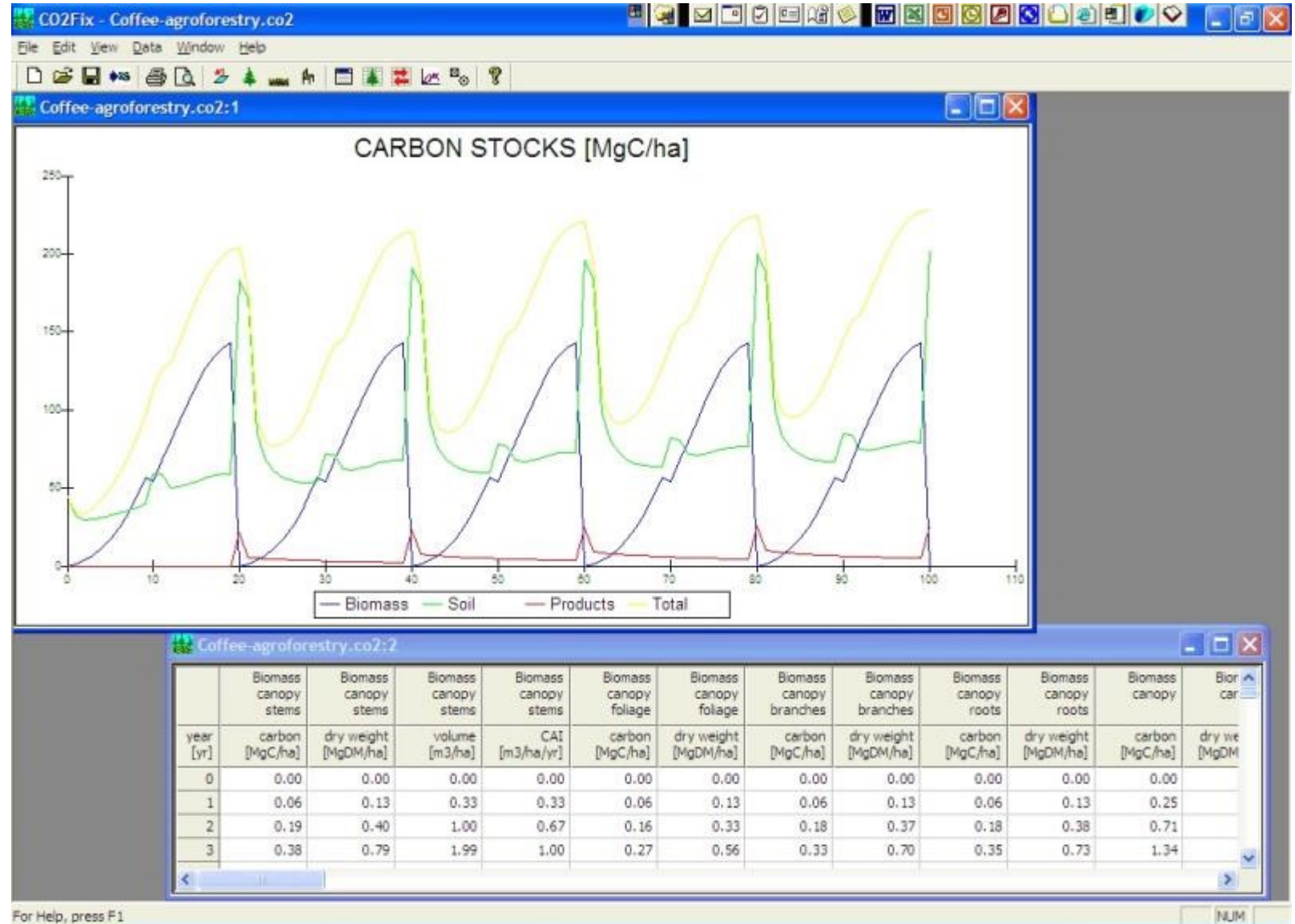
# Yield tables -> input data for growth

Age	Volume	MAI	CAI
0	0		
1	2.7	2.70	2.7
2	13.5	6.75	10.8
3	28.4	9.47	14.9
4	44.6	11.15	16.2
5	60.6	12.12	16
6	75.8	12.63	15.2
7	89.8	12.83	14
8	102.5	12.81	12.7
9	113.7	12.63	11.2
10	121.8	12.18	8.1
11	126.8	11.53	5
12	128	10.67	1.2



MAI = Mean annual increment  
CAI = Current annual increment

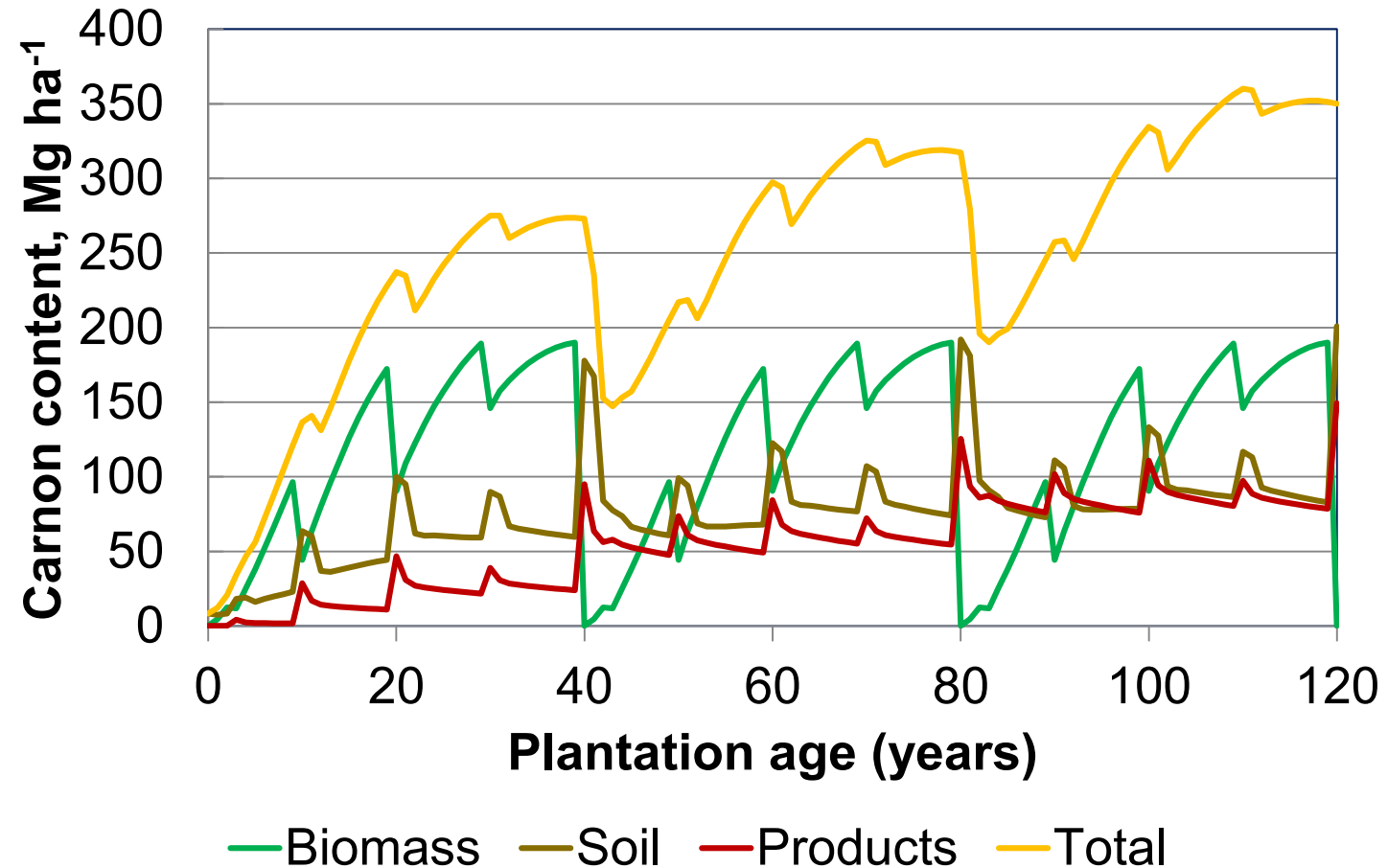
# Multi-strata coffee agroforestry







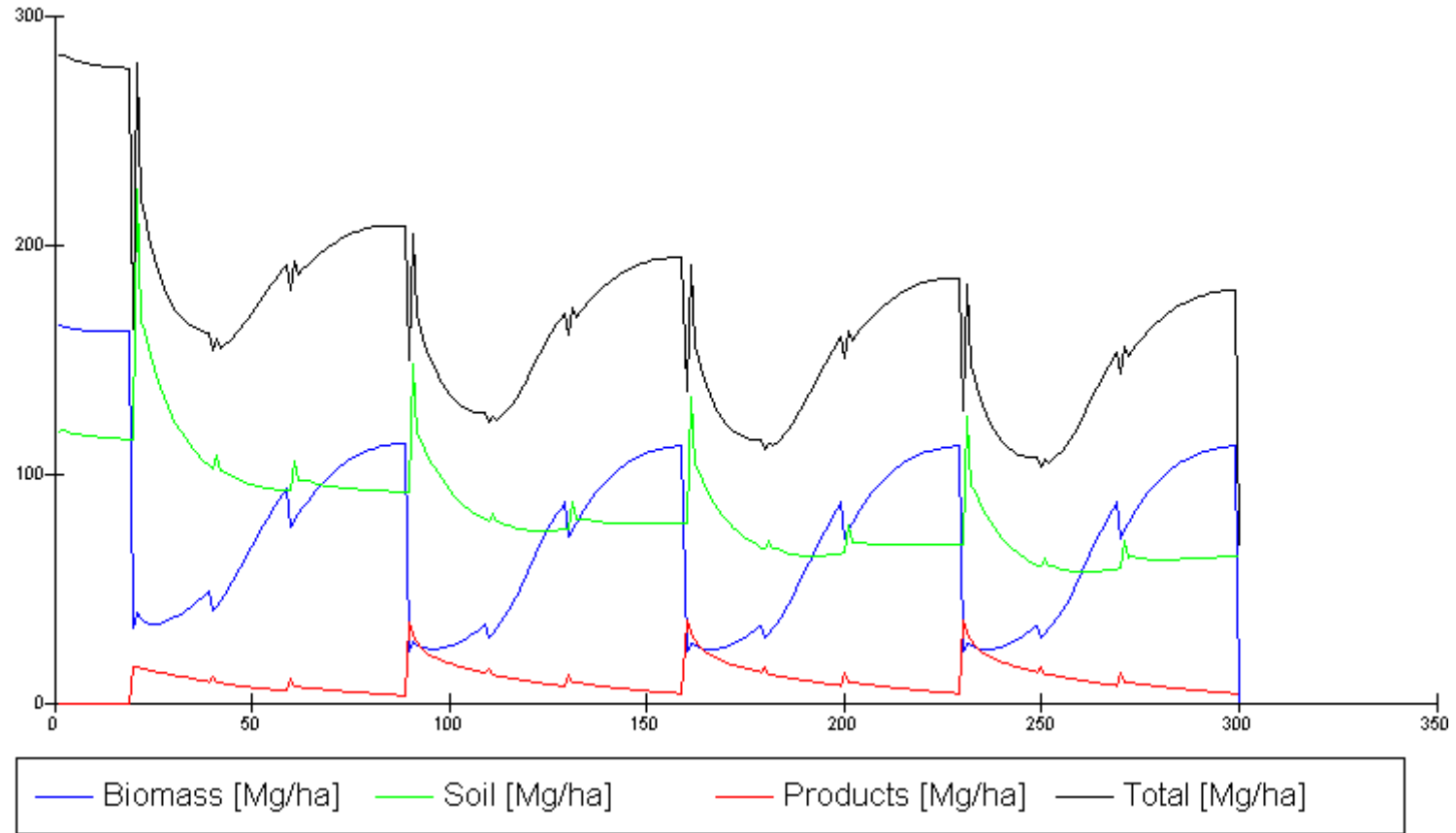
# Carbon dynamics in a teak plantation (data from Costa Rica)



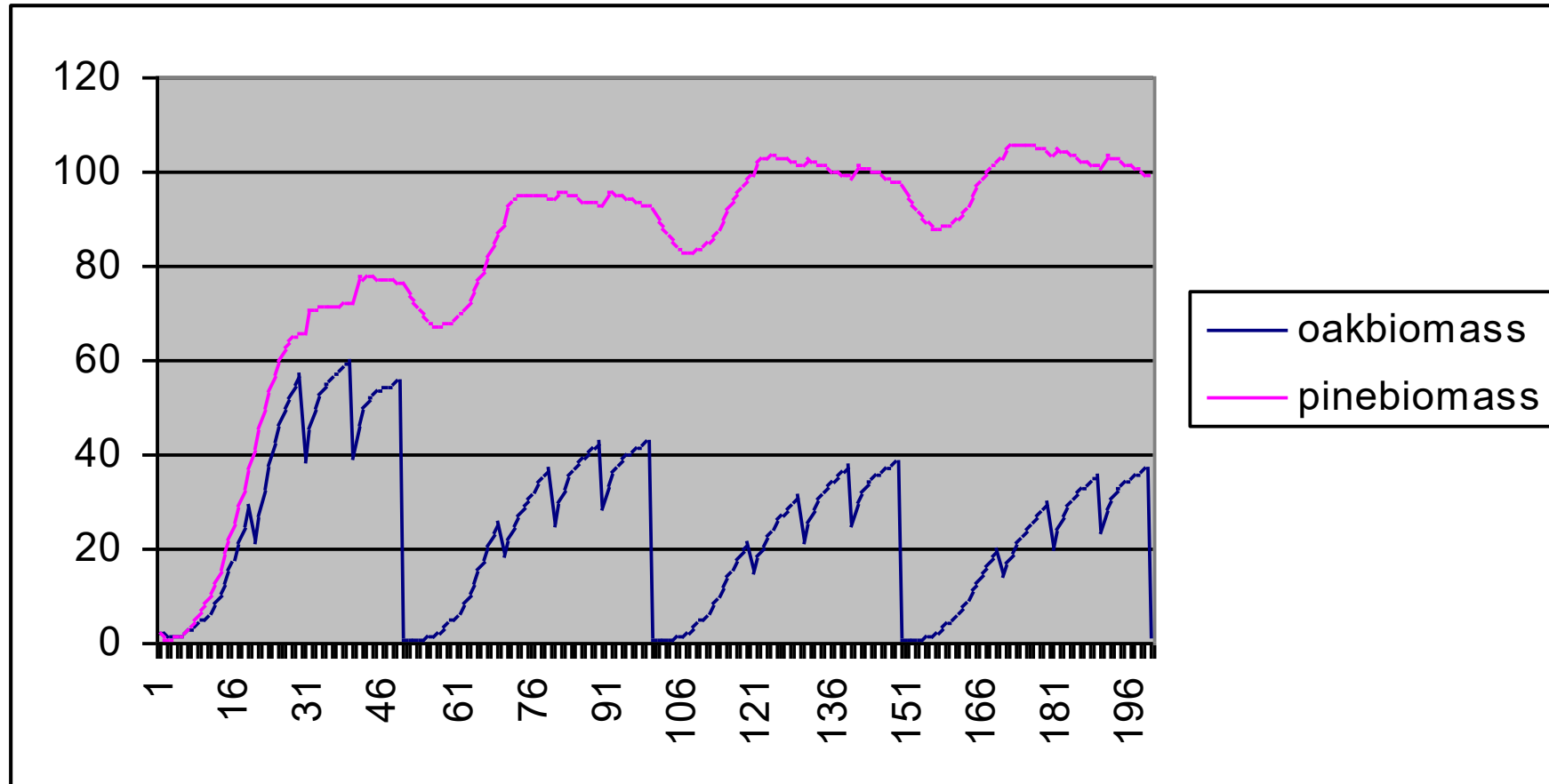
MAI<sub>Vol</sub> =  
12 m<sup>3</sup>h<sup>-1</sup>year<sup>-1</sup>

Masera et al. 2003

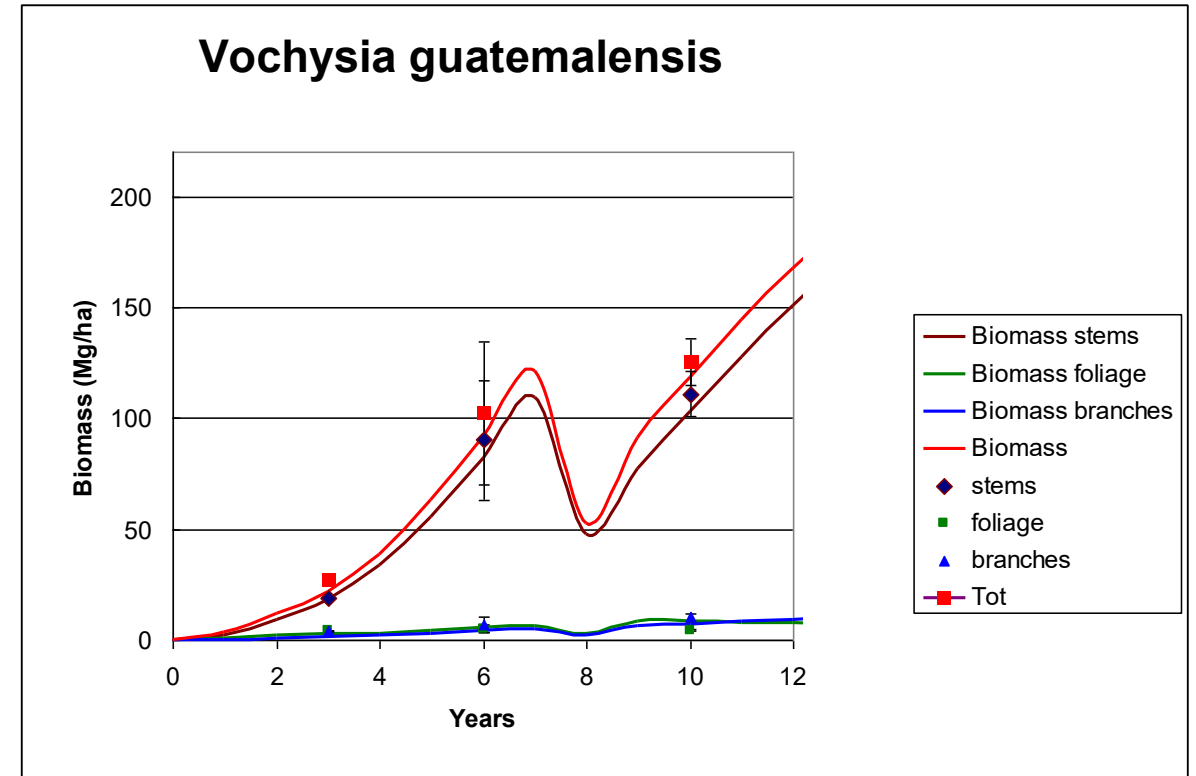
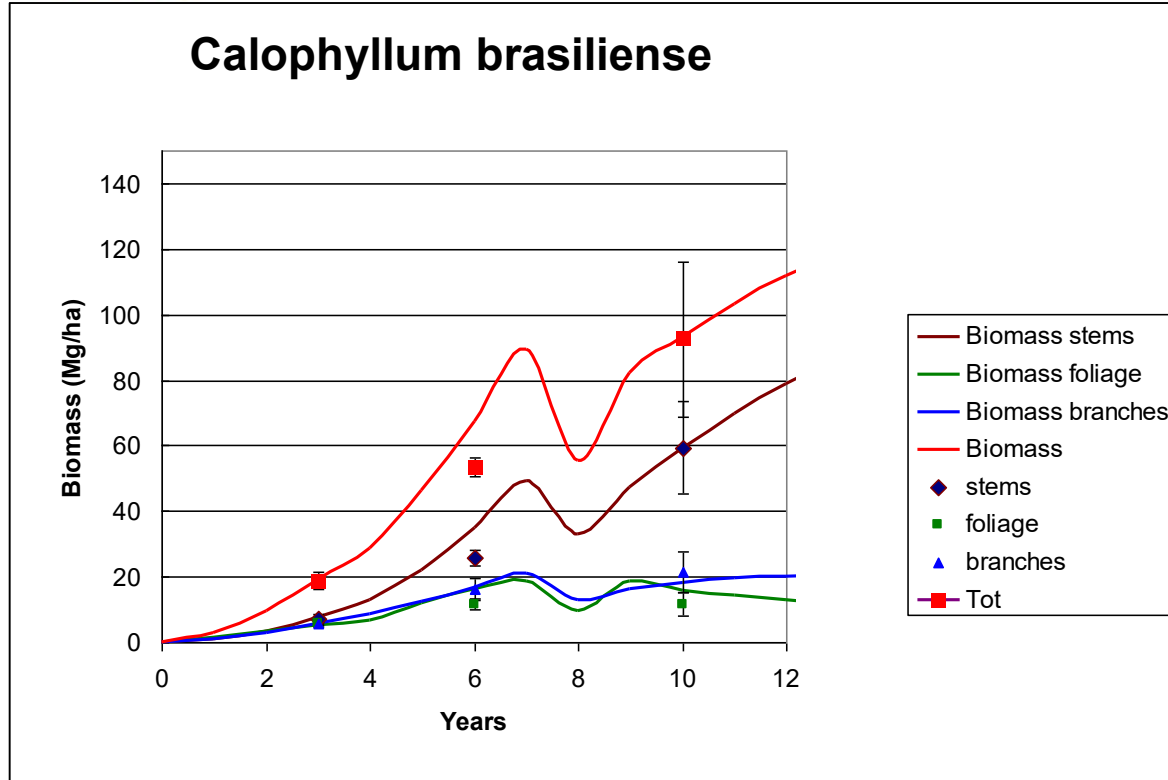
# Natural forest (data from Costa Rica)



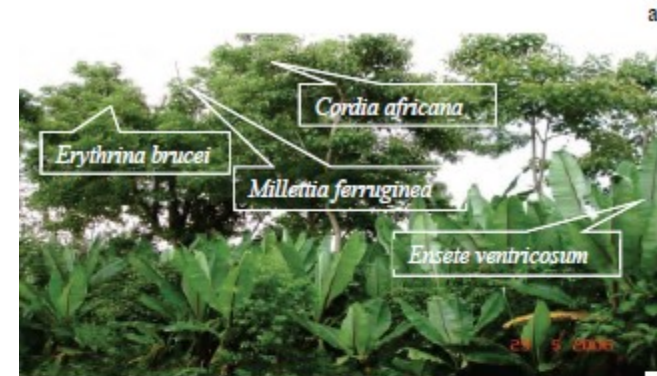
# Pine-oak forest in Mexico



# CO2Fix – validation with independent data



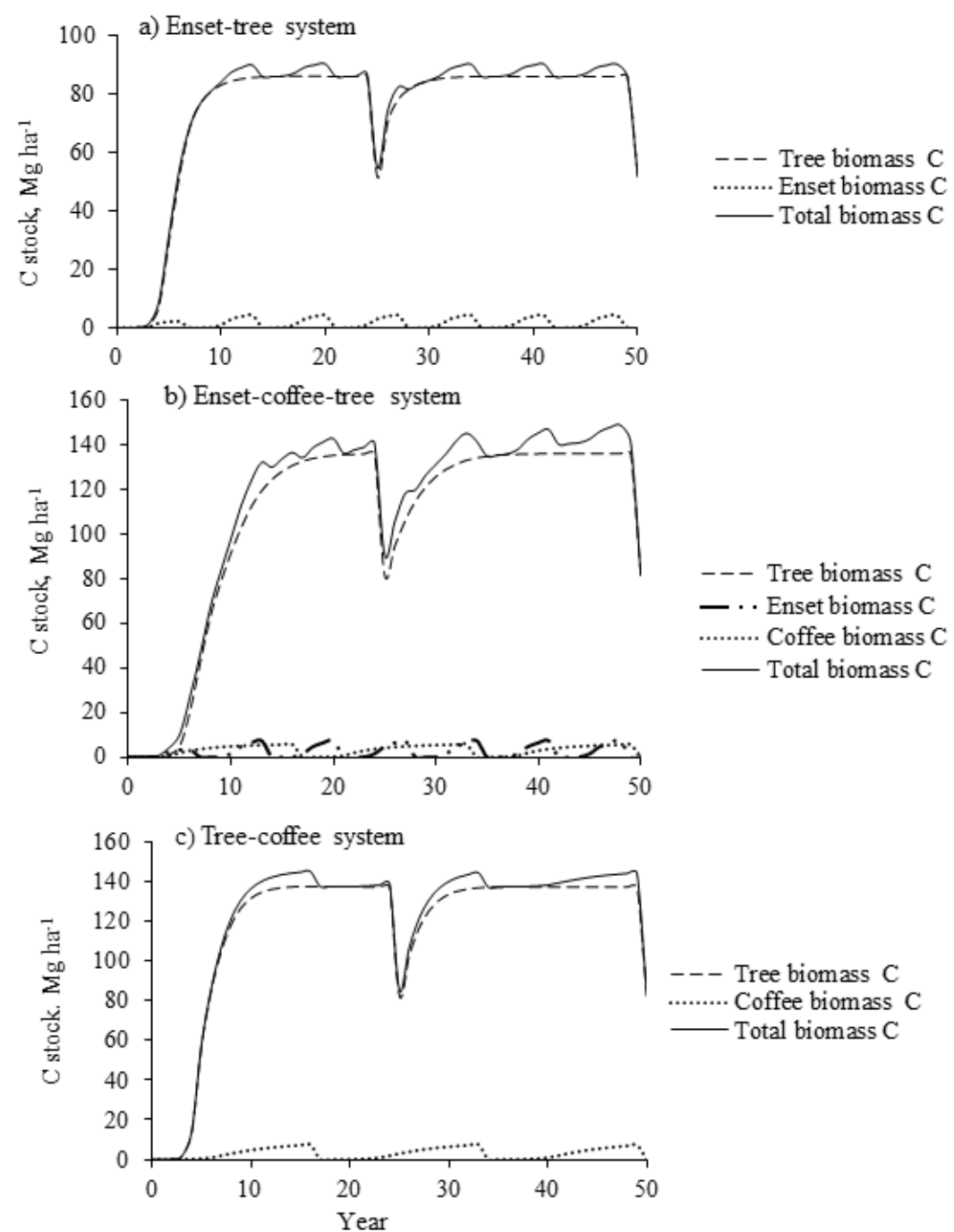
# CO2FIX modelling in Enset (*Ensete ventricosum*) agroforestry systems, Ethiopia





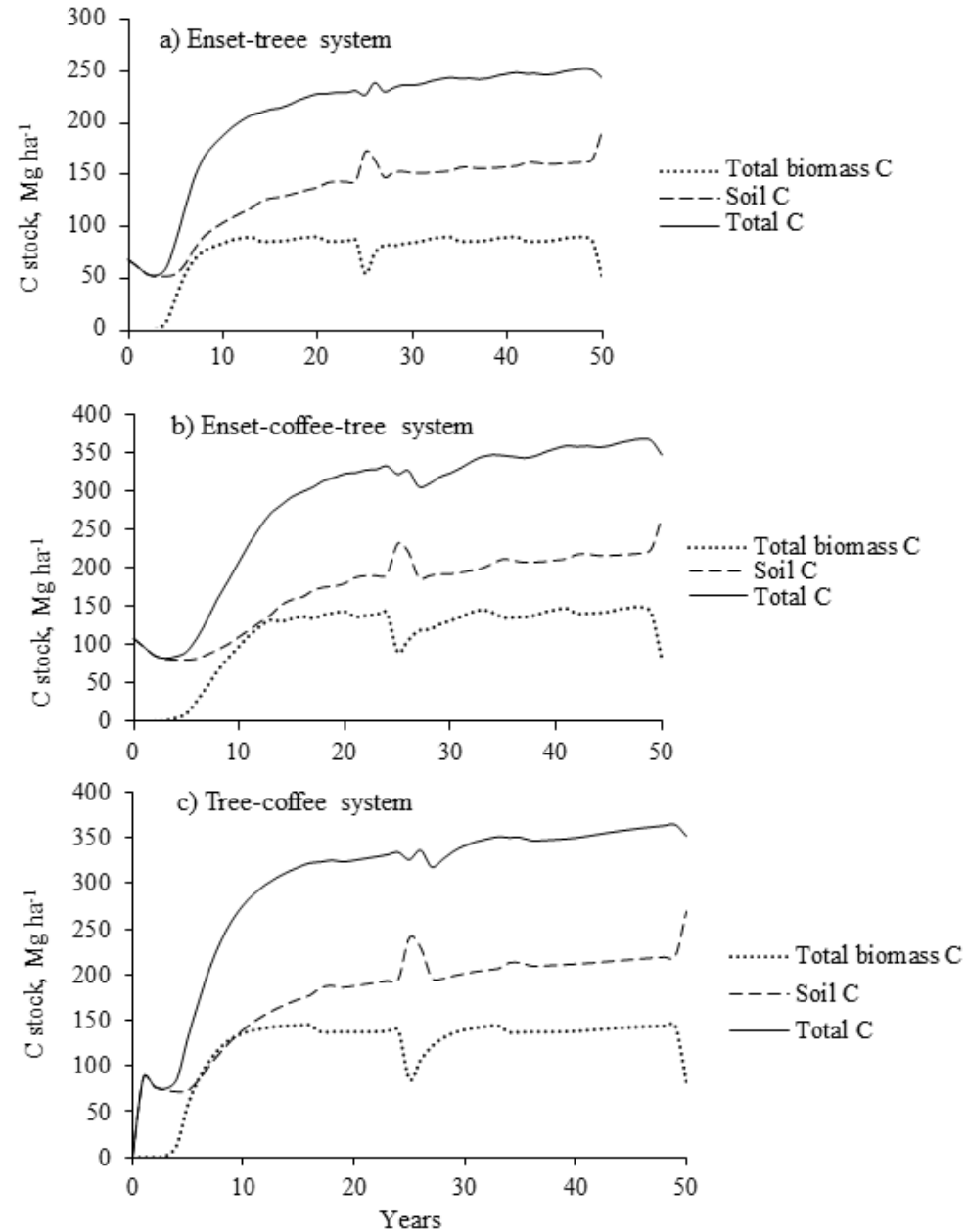
# Simulated above-ground C stocks (Mg C ha<sup>-1</sup> year<sup>-1</sup>) over 50 year period

Negash & Kanninen (2015)





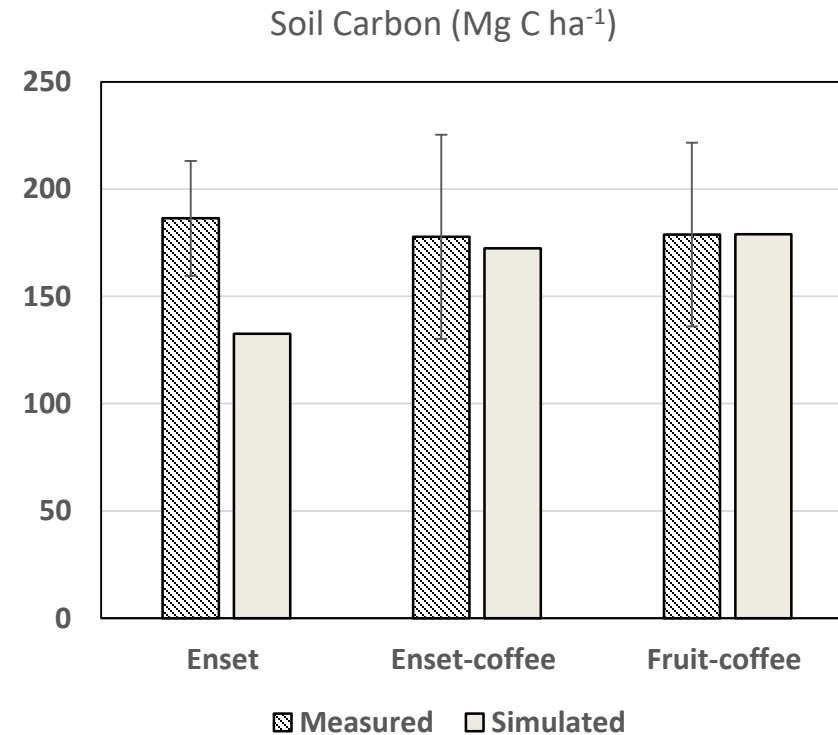
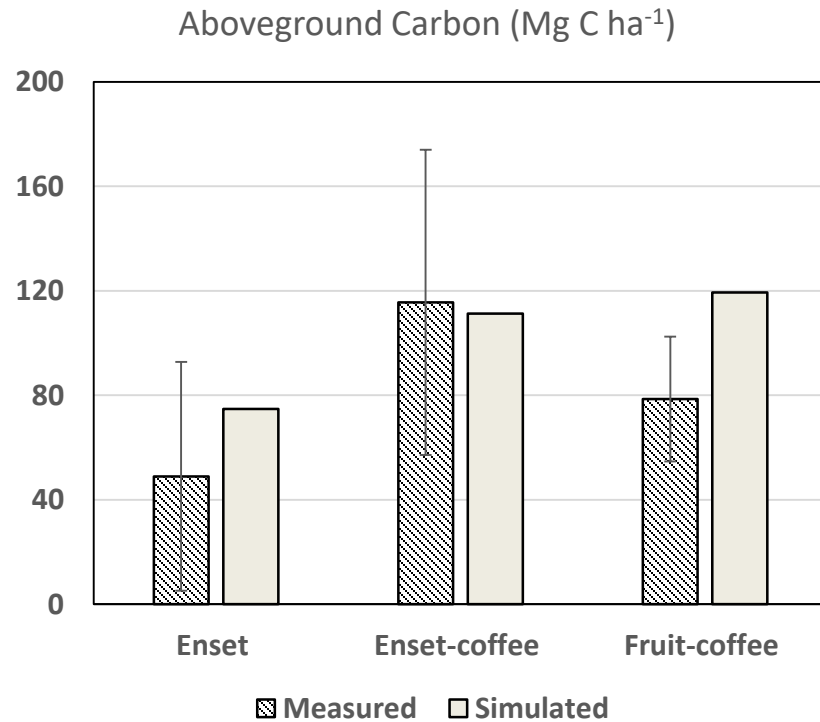
# Simulated total & above-ground & soil C stocks (Mg C ha<sup>-1</sup> year<sup>-1</sup>) over 50 year period



Negash & Kanninen (2015)



# Measured vs. Simulated carbon stocks (ages 10– 40 years)





# Example from India (2010)

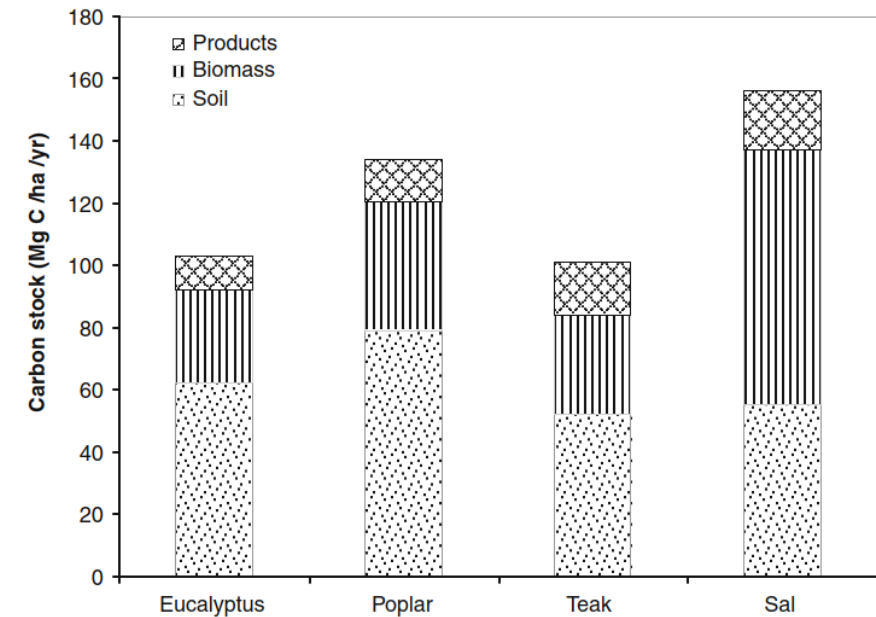
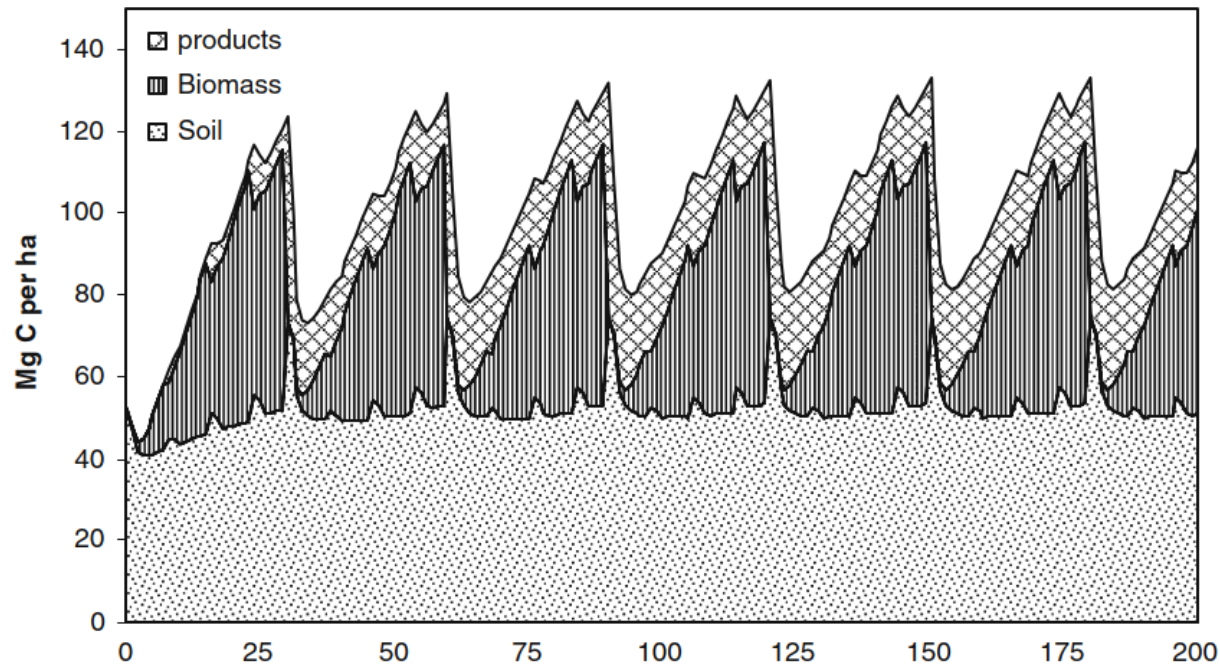
Mitig Adapt Strateg Glob Change  
DOI 10.1007/s11027-010-9230-5

ORIGINAL ARTICLE

## Carbon storage and sequestration potential of selected tree species in India

Meenakshi Kaul · G. M. J. Mohren · V. K. Dadhwal

c) Carbon stocks in the Teak forest





**THANK YOU FOR YOUR ATTENTION**