Vetiver Systems for Carbon Sequestration and Economic Returns

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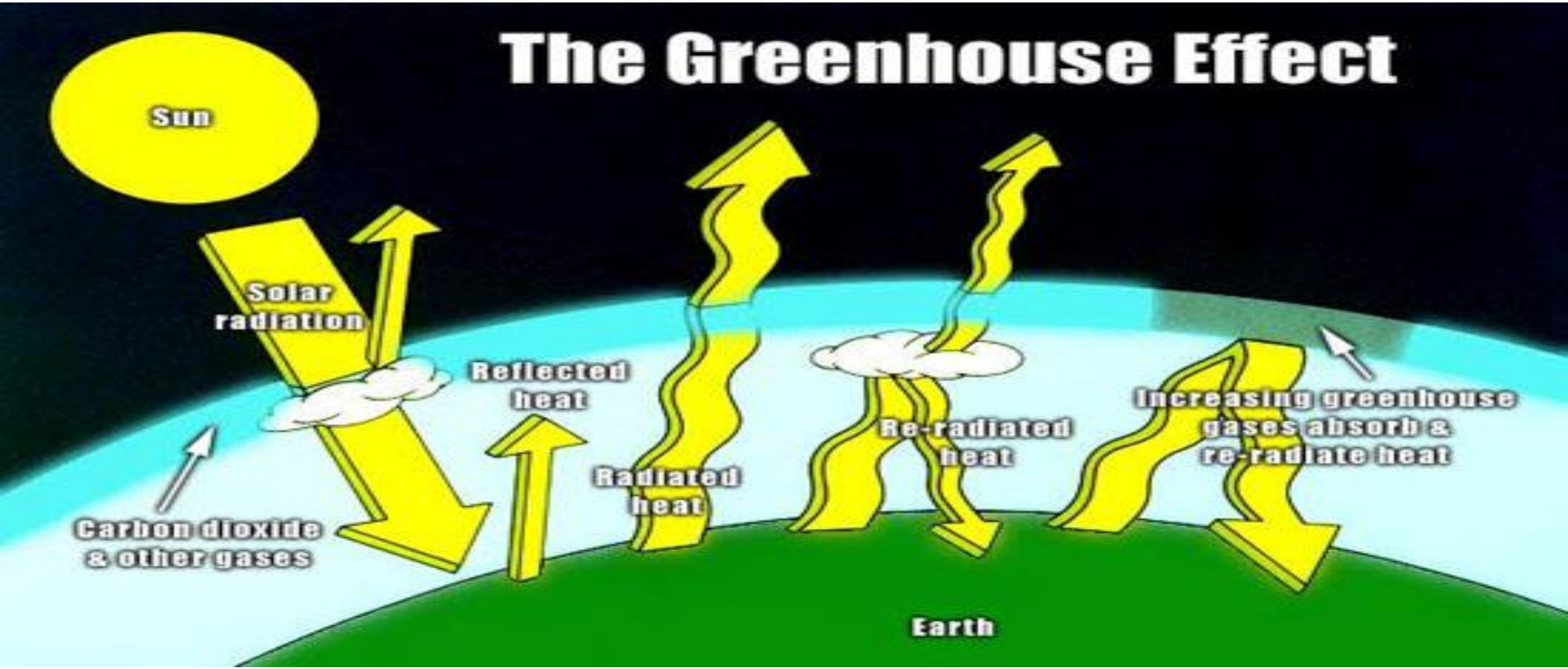
Workshop on Vetiver, India Vetiver Network(INVN)

TNAU, 11 April,2016

Global Warming



source: http://www.environment.sa.gov.au/sustainability

Where humanity's CO2 comes from

91% 33.4 billion metric tonnes

Fossil Fuels & Cement 2010

9% 3.3 billion metric tonnes

Land Use Change 2010

Where humanity's CO2 goes

50% 18.4 billion metric tonnes

Atmosphere 2010

26% 9.5 billion metric tonnes

Land 2010

24% 8.8 billion metric tonnes

Oceans 2010

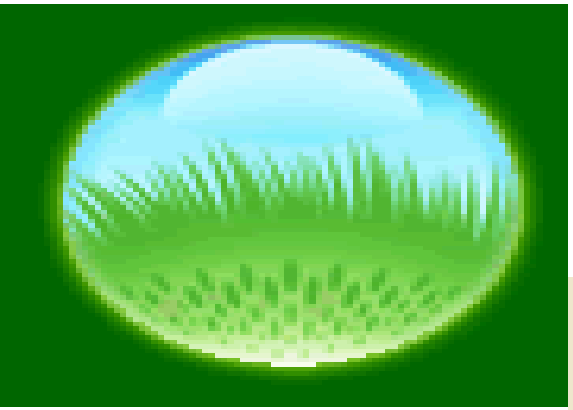
Global Carbon Project

2010 data updated from:
Le Quéré et al. 2009, Nature Geoscience
Canadell et al. 2007, PNAS

CO2Now.org

Significant progress in carbon pricing has been made over the last ten years. In 2015, about 40 national and over 20 subnational jurisdictions, representing almost a quarter of global greenhouse gas emissions (GHG), are putting a price on carbon.

World Bank. 2015. ***Carbon pricing watch 2015 : an advance brief from the state and trends of carbon pricing 2015***



Visit the TVNI Website
The Vetiver Network International Blog

Thanks for sending your abstract/. Looks interesting. Could you please send me your full paper.
Thank you
Dick Grimshaw

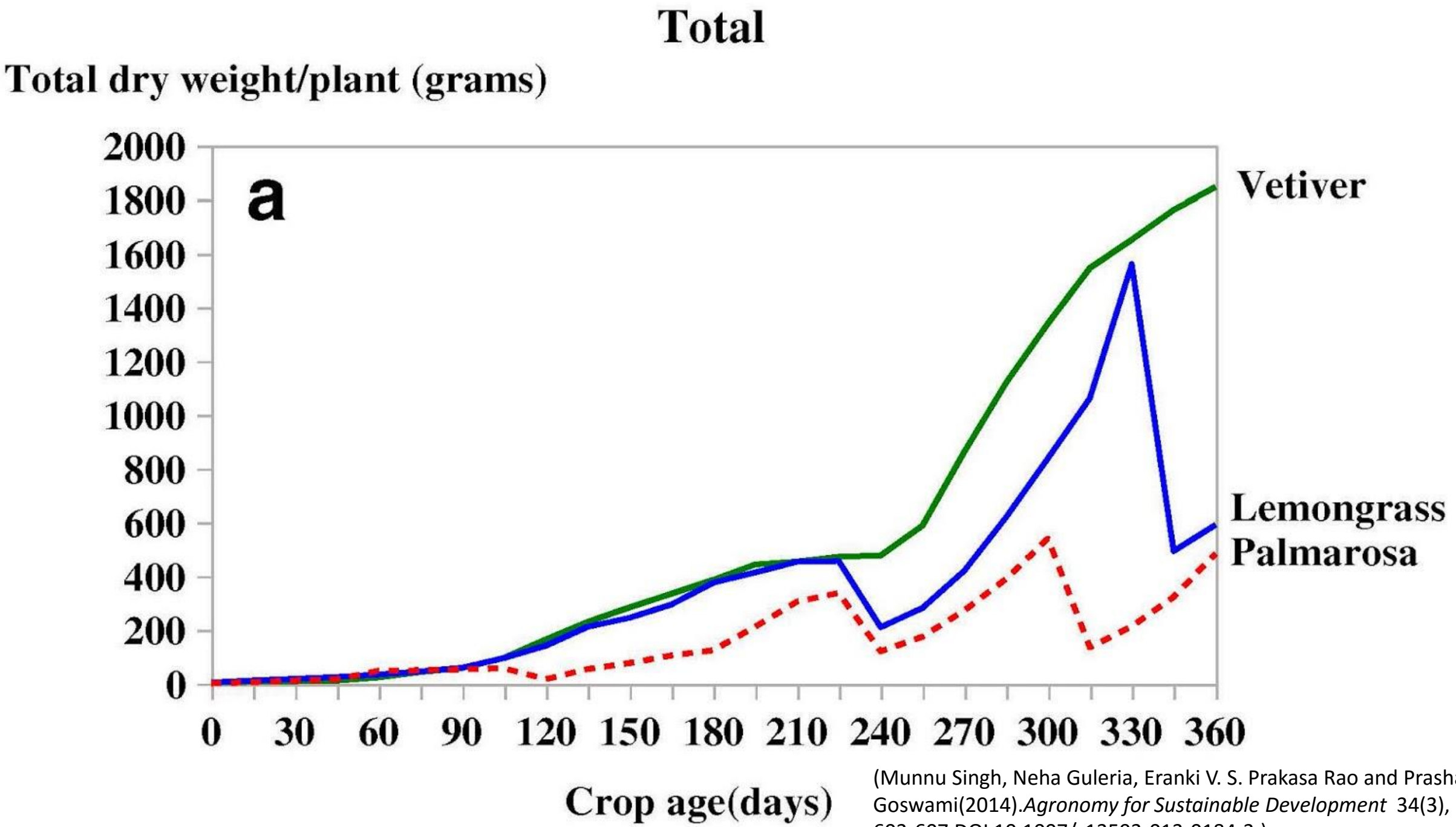
Carbon Sequestering - the Role of the Vetiver System

Posted by The Vetiver Network (International)

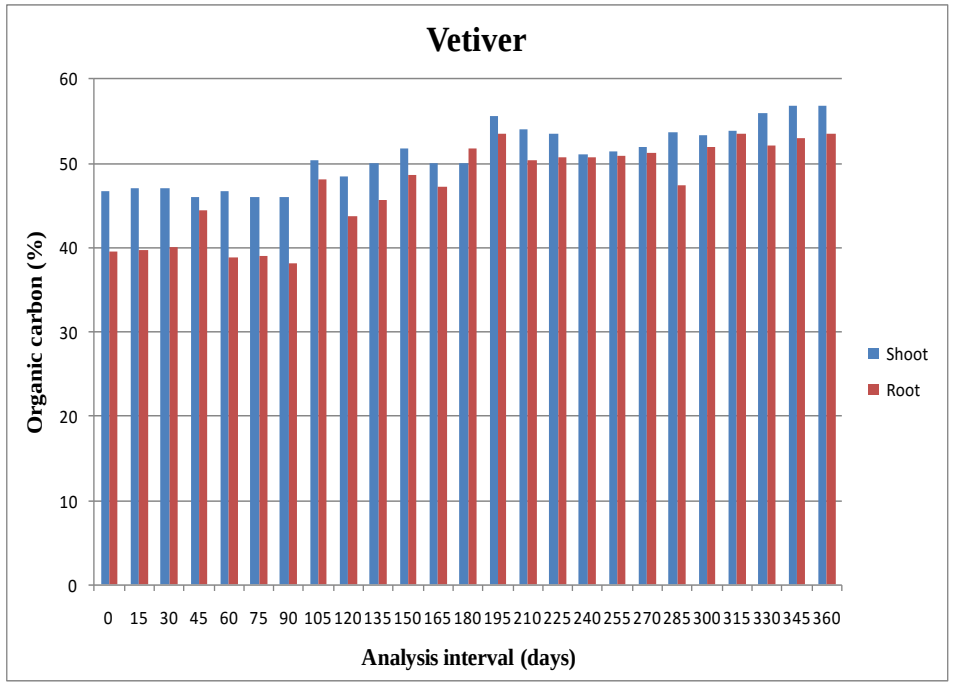
"I have written before about Vetiver's potential for sequestering Atmospheric carbon at high levels. Here is an abstract of a recent, 2013 study, "Efficient C sequestration and benefits of medicinal vetiver cropping in tropical regions" by Munnu Singh, Neha Guleria , Eranki V.S. Prakasa Rao, and Prashant Goswami that supports this contention."

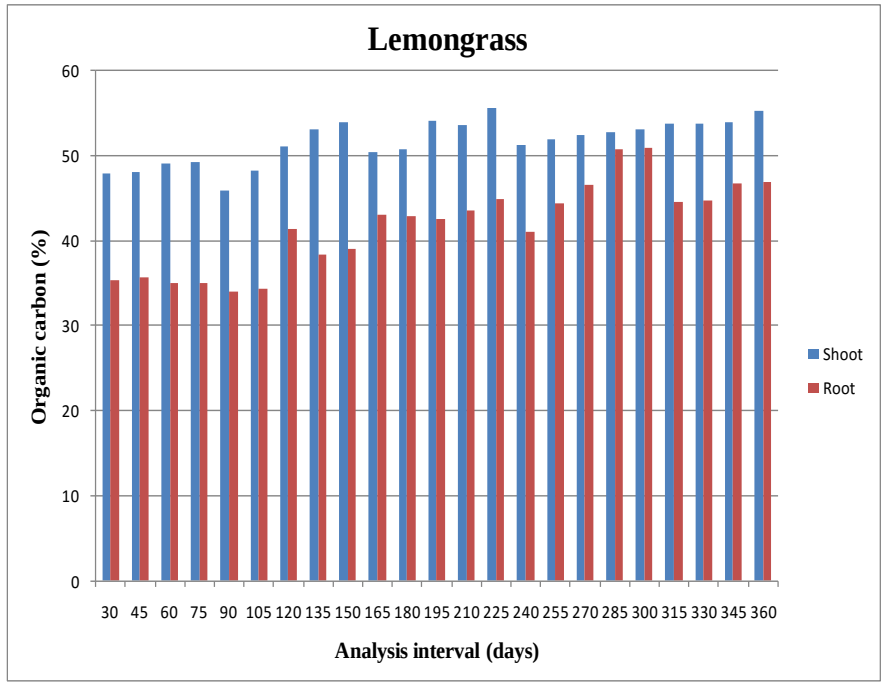
We have here a truly unique plant that is able to significantly impact the environment for the better if widely used.

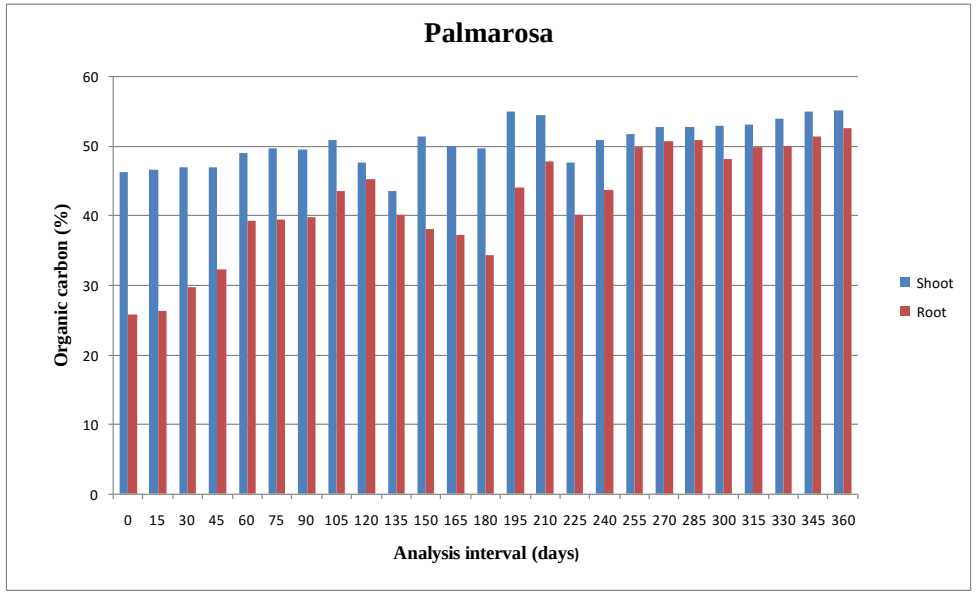
Dick Grimshaw



(Munnu Singh, Neha Guleria, Eranki V. S. Prakasa Rao and Prashant Goswami(2014).*Agronomy for Sustainable Development* 34(3), 603-607 DOI 10.1007/s13593-013-0184-3.)







Organic Carbon Sequestered in three aromatic crops(CSIR Network Project)

Carbon should be sequestered to maintain soil functions and also to protect environment

Table 1 Comparative carbon content (percent), dry matter production, and C sequestration by three aromatic grasses

Crop	Carbon (%)		Dry matter (Mg ha^{-1} year^{-1})		C sequestered (Mg ha^{-1} year^{-1})		
	Shoot	Root	Shoot	Root	Shoot	Root	Total
Vetiver	50.53	50.27	28.62	1.56	14.46	0.78	15.24
Lemongrass	44.45	48.14	10.5	1.57	4.83	0.55	5.38
Palmarosa	52.77	43.49	11.11	0.65	5.86	0.28	6.14

(Munnu Singh, Neha Guleria, Eranki V. S. Prakasa Rao and Prashant Goswami(2014).*Agronomy for Sustainable Development* 34(3), 603-607 DOI 10.1007/s13593-013-0184-3.)

Estimated C-sequestration by vetiver in degraded lands in India

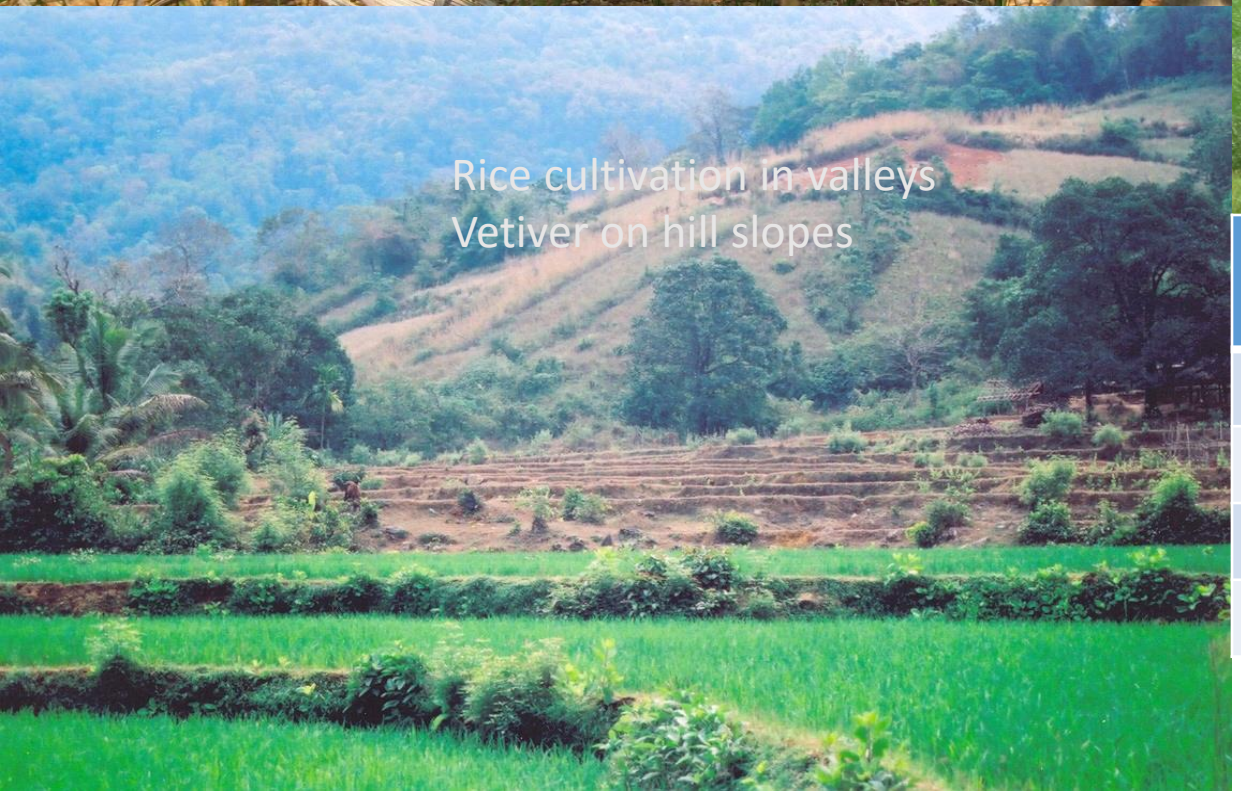
Total Waste lands (m ha)	C-sequestered(Tg yr^{-1}) in India (10 m ha of degraded soils)	% of emissions (2009)	
		India	World
107.83	200	46.1	2.4

M.Singh, Neha Guleria, E. V. S. Prakasa Rao & P. Goswami(2014). *Agronomy for Sust. Dev* 34(3), 603-607 DOI 10.1007/s13593-013-0184-3

Cultivation of vetiver, rice, areca nut and coconut in coastal Karnataka

Crops and economics in western *ghats* region

Vetiver with banana



Rice cultivation in valleys
Vetiver on hill slopes

Vetiver; arecanut and a distillation unit in the background

Crop	Net income (Rs/ha)
Rice	12 000
Areca nut	49 000
Cashew nut	53 000
Vetiver	123 000

E.V.S.Prakasa Rao *et al*., (2015). *Sustainable Agriculture Reviews* .Ed. E. Lichtfouse, Springer International Publishing Switzerland. Vol. 17: 337-355.DOI 10.1007/978-3-319-16742-8_10

Method of distillation	Oil recovery (%)	Oil yield (kg/ha)
Conventional	0.78	17
Improved	1.20	25

Method of distillation	Firewood consumption (kg/batch)	Man days/batch
Conventional	600	18
Improved	150	3

E.V.S.Prakasa Rao *et al*., (2015). *Sustainable Agriculture Reviews* .Ed. E. Lichtfouse, Springer International Publishing Switzerland. Vol. 17: 337-355.DOI 10.1007/978-3-319-16742-8_10

Vermicomposting vetiver wastes

Recycling of agro-wastes by vermi-composting (20 ftX 6 ft X 1.5 ft pits)

Vermi-compost produced	300 kg/pit/batch
N(%)	1.4
P(%)	0.12
K(%)	0.22
Organic C (%)	22.9

E.V.S.Prakasa Rao *et al.*, (2015). *Sustainable Agriculture Reviews* .Ed. E. Lichtfouse, Springer International Publishing Switzerland. Vol. 17: 337-355.DOI 10.1007/978-3-319-16742-8_10

Vetiver dry leaves are used to make temporary hutments for the farm workers in the western ghats area, India

Dolomite application in acidic soils increase vetiver yields

Treatment	No. of tillers/plant	Total biomass(g/plant)	Root dry wt(g/ plant)	Oil yield(g/plant)
Control	14.3	169.7	32.0	0.32
Dolomite treated	34.3	588.7	48.0	0.48

Nagendra Prasad, N.S.Ravindra, E.V.S.Prakasa Rao and A. Srinivas (2014). *Indian Perf.* 58(4): 39-41.

Can we use VS for global CO_2 capture and sequestration to mitigate climate change ?

Thank you for your attention