

# The VETIVER SYSTEM in AGRICULTURE



**Global applications for small, medium, and large landholdings**



# KEY APPLICATIONS

- On Farm soil and water conservation (see [more](#))
  - yield through better soil structure and fertility.
  - moisture retention and water quality.
  - works with nature to reduce pesticides use and pest damage to some crops.
- Forage production
  - If managed correctly vetiver provides a good quality and drought tolerant feed.
- On Farm pollution control (see [VS for contaminated land and water](#))
  - Clean up of excess agricultural chemicals in rainfall and sediment disposal
  - Treating livestock effluent.
- Farm infrastructure protection
  - Roads, drains, canals, culverts, building sites
- Land Rehabilitation
  - habitat regeneration
  - Gully rehabilitation and prevention



# SOIL MOISTURE AND SOIL FERTILITY

Nigerian research (University of Ibadan (Babolala *et al.* 2003)

- On 6% slopes in Nigeria, results of trials over a 3 year period using vetiver hedgerows showed soil physical and chemical conditions improved.
- Crop yields increased 11 – 26% for cowpea; 50% for maize under vetiver treated plots.
- Soil loss and runoff water at the lower end of 20m runoff plots were 70% and 130% higher respectively for non-vetiver control plots than vetiver plots.
- Vetiver protected plots were consistently richer in nutrient contents than control plots. Nitrogen use efficiency was enhanced by about 40%. These results have been repeated (with variations depending on soil type and slope) elsewhere in tropical and semi arid regions.





# Small farm application of Vetiver for soil and moisture conservation

Over 20,000 farmers planted vetiver hedgerows in the Mettu area of western Ethiopia resulting in significant reduction in soil loss, increased and sustainable crop yields, and reduced conservation maintenance costs





# Large scale commercial farm Vetiver application

At large scale in Australia (black vertisols) vetiver hedgerows protect against flood and reduces erosion. In such cases vetiver can be machine planted





# Trapping sediment on commercial farm - Australia



# In agriculture, vegetable beds are more productive when vetiver is planted along borders (Thailand)





# Control section of banana plantation demonstration site: (without vetiver, Senegal semi-arid)



## Same site : banana WITH vetiver hedge

**Senegal (semi arid). With better moisture retention, harvest was 2 months earlier than control**





# Vetiver hedge as a windbreak protects seedlings (China)



**Note size of plants near and far from hedge**







# A TAMARIND TREE

Below: Tree of the same age, without help from vetiver.

Above: One year old Tamarind, circled with vetiver (Chiang Rai Research Station, Thailand). Arbuscular mycorrhizal activity, associated with vetiver roots, results in better soil nutrient translocation at depth. The latter combined with improved soil moisture and more soil micro-fauna activity results in better tree growth





# Dune invasion of banana plantation (Les Niayes, Senegal)



Left: Before. Note condition of banana

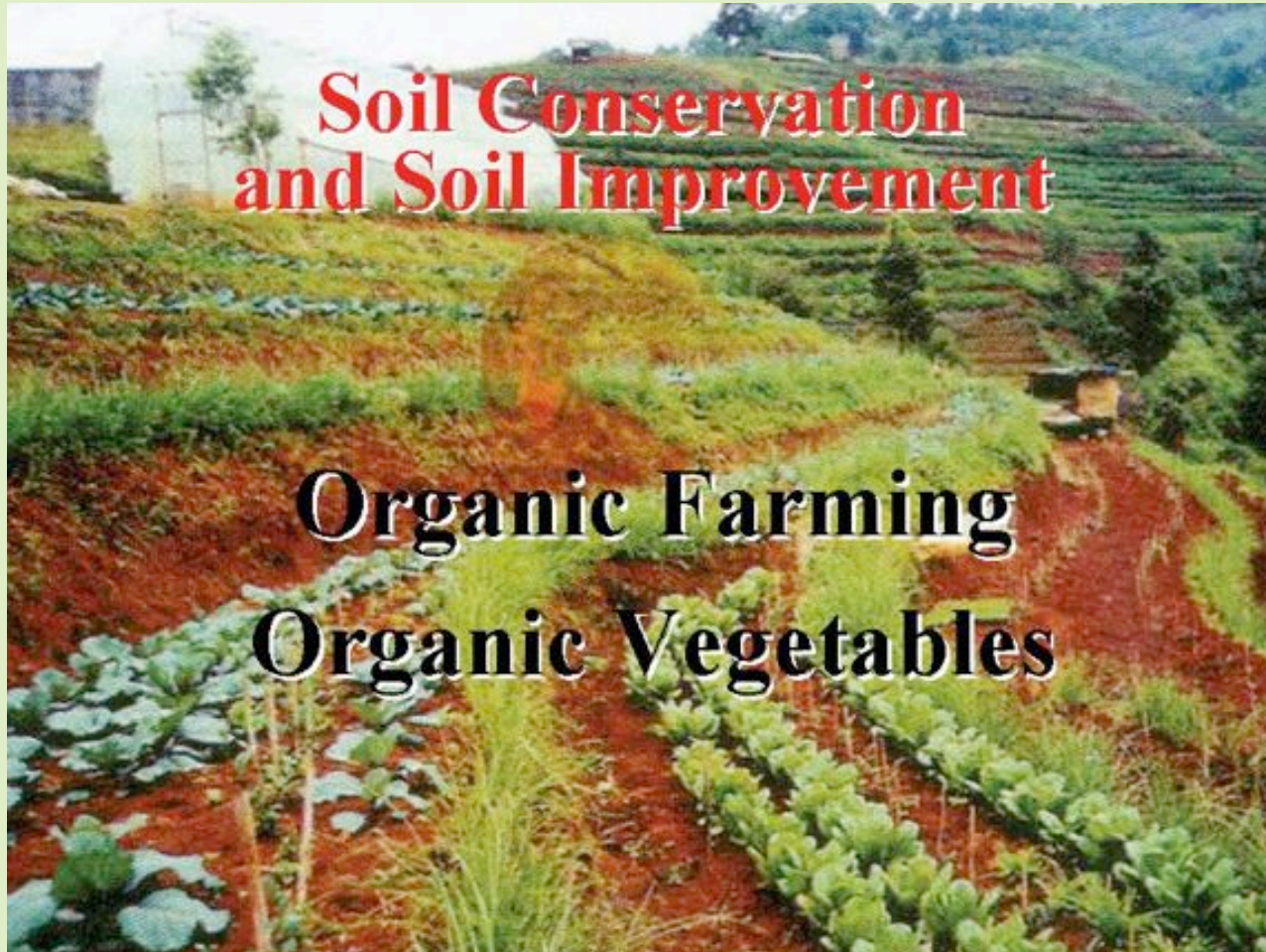


Dune stabilized with one vetiver hedge





## VS used in organic farming (Thailand)





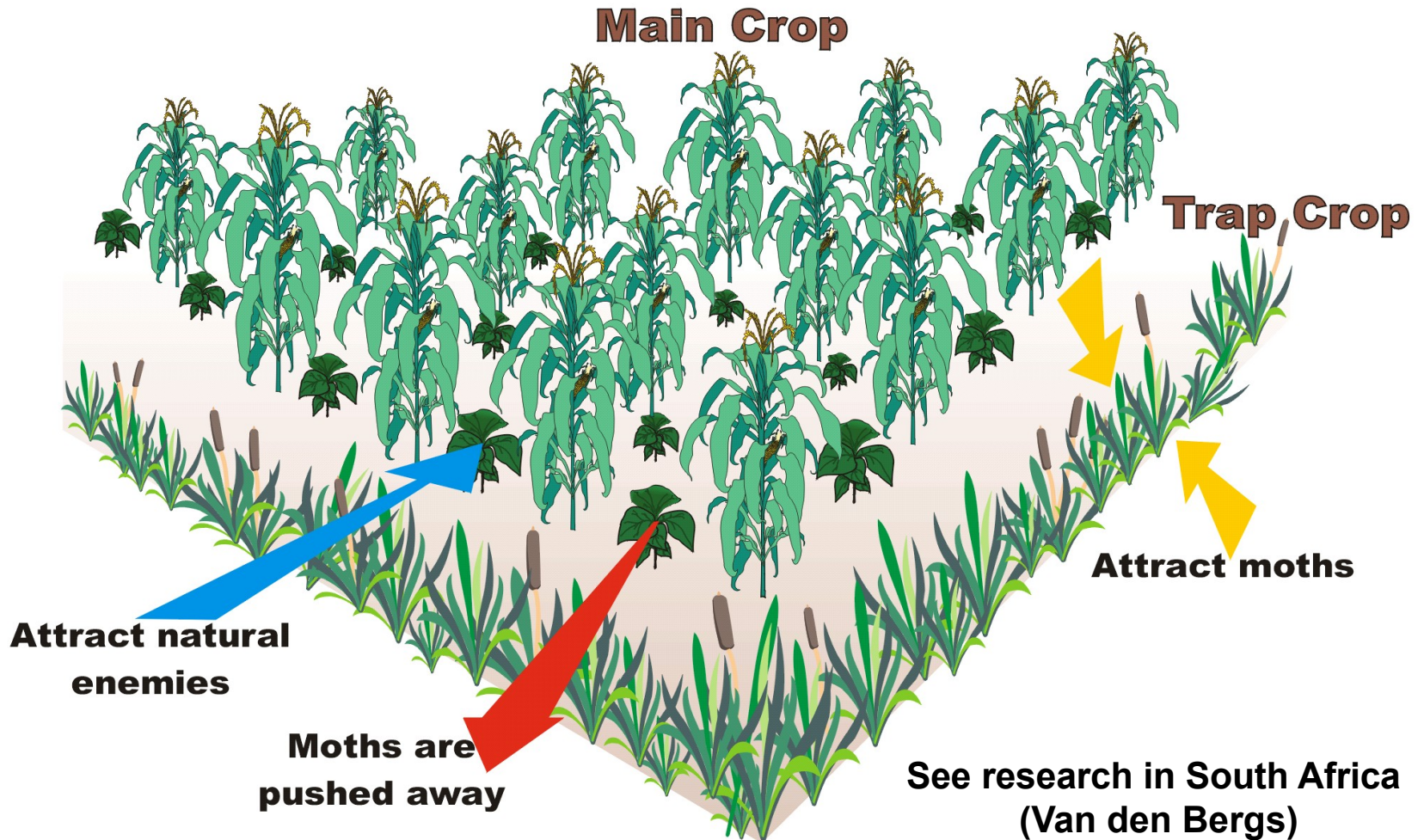
# VS protects this maize field in Ghana in more ways than one:

- As soil & moisture conservation measure
- As host to stem borers that prefer laying their eggs on vetiver, the developing larvae fall off and die, thus reducing stem borer losses in maize and sorghum. Chinese experiments also indicates that stem borer in rice can be significantly reduced when associated with vetiver.



# Habitat management system with Vetiver

## PUSH-PULL SYSTEM





# Stem bore larvae dropping from vetiver leaves, unable to survive





# Vetiver Forage for Livestock



Vetiver is a useful forage if fed prior to maturity. It is particularly useful under drought prone climates. All farm stock appear to eat it.

**Above:** stall fed vetiver in Vietnam. **Right:** free range fed vetiver in Australia



# Vetiver feed values compared to other forage grasses

Analytes	Units	Vetiver grass			Rhodes	Kikuyu
		Young	Mature	Old	Mature	Mature
Energy (Ruminant)	kCal/kg	522	706	969	563	391
Digestibility	%	51	50	-	44	47
Protein	%	13.1	7.93	6.66	9.89	17.9
Fat	%	3.05	1.30	1.40	1.11	2.56
Calcium	%	0.33	0.24	0.31	0.35	0.33
Magnesium	%	0.19	0.13	0.16	0.13	0.19
Sodium	%	0.12	0.16	0.14	0.16	0.11
Potassium	%	1.51	1.36	1.48	1.61	2.84
Phosphorus	%	0.12	0.06	0.10	0.11	0.43
Iron	mg/kg	186	99	81.40	110	109
Copper	mg/kg	16.5	4.0	10.90	7.23	4.51
Manganese	mg/kg	637	532	348	326	52.4
Zinc	mg/kg	26.5	17.5	27.80	40.3	34.1





# Hydroponic treatment of farm effluent in storage ponds





# Water quality improvement on Indian Tea Estate

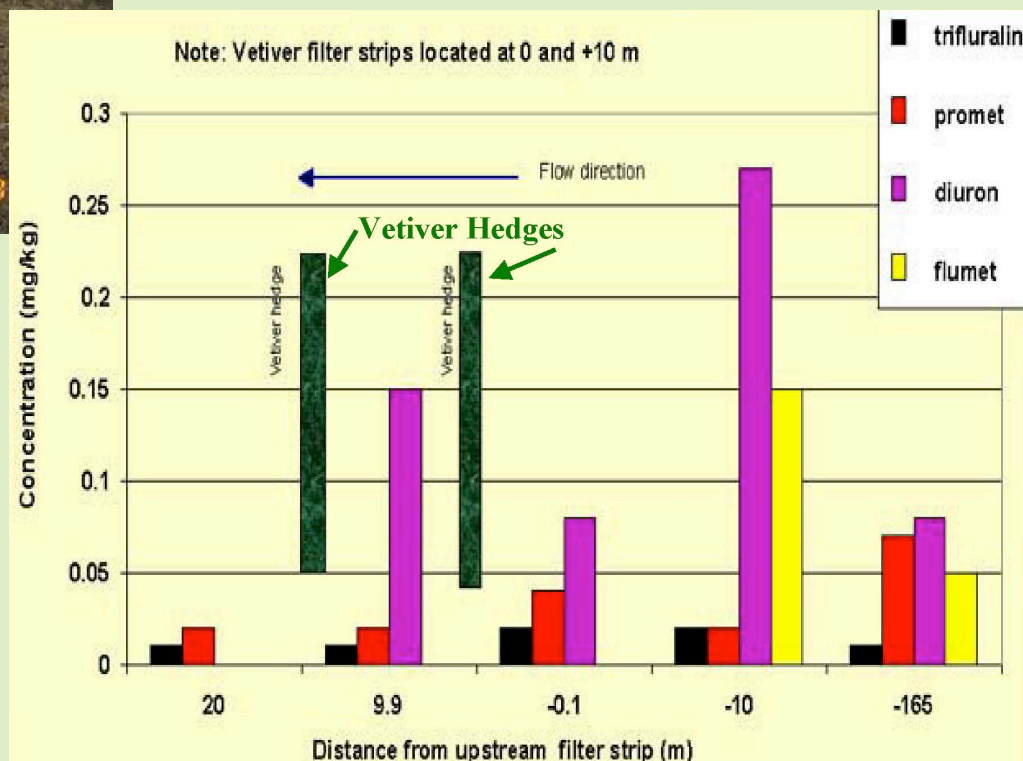






Vetiver hedges will trap and reduce toxic agric chemicals from runoff – sediment.

**Above:** Drain associated hedgerows are effective in trapping sediment. **Right:** reduction in herbicide concentration when drainage water passes through vetiver filter hedges.



# Farm drainage protection



Australia - Queensland



Zimbabwe - Hippo Valley



South Africa - Natal





## Farm dam stabilization and protection



Left: 6 months after planting with vetiver.



Right: 1 year after planting with vetiver.





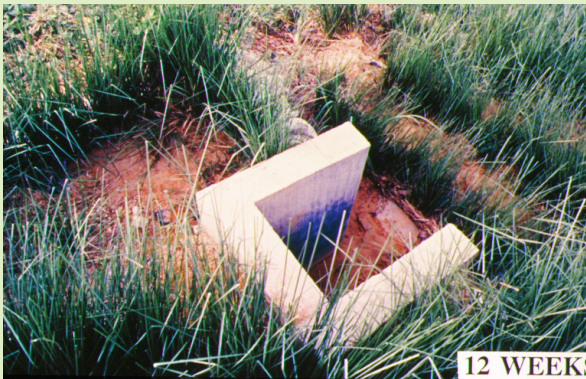
# Farm road Vetiver protection and stabilization



Irrigation scheme road- Madagascar



Coffee farm road in Panama

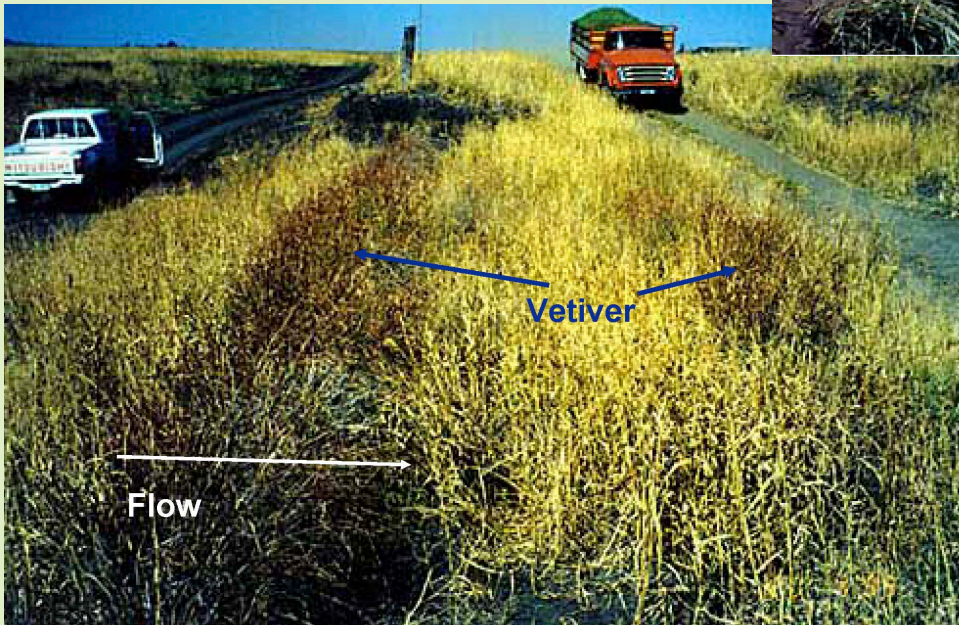


Left: culvert protection on rubber estate - Malaysia





# Vetiver protection of farm road causeway



**Top left:** The problem - tropical storms frequently washed out this concrete causeway. **Above:** The fix - two rows of vetiver upstream of the causeway. **Left bottom:** the result, a stable causeway





# Gully remediation



Top left: typical gully problem on a farm. Above: The fix using vetiver. Bottom left: the result – a stabilized gully





## Vetiver protects farm buildings



Labor houses in Natal South Africa protected with vetiver – vetiver also will reduce domestic effluent run off from these houses.

