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

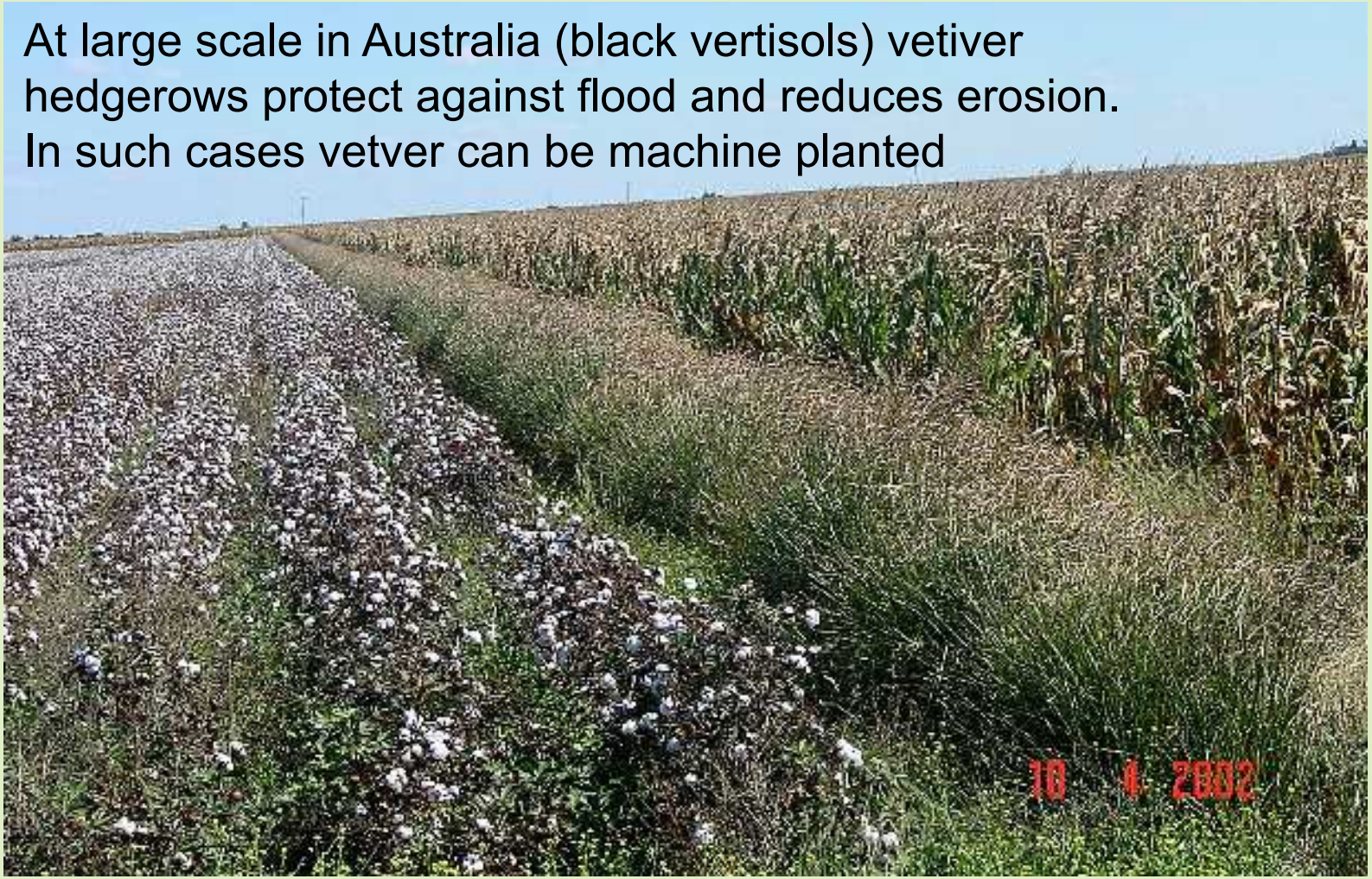
Nigerian research (University of Ibadan (Babolala *et al.* 2003)

- 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



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.

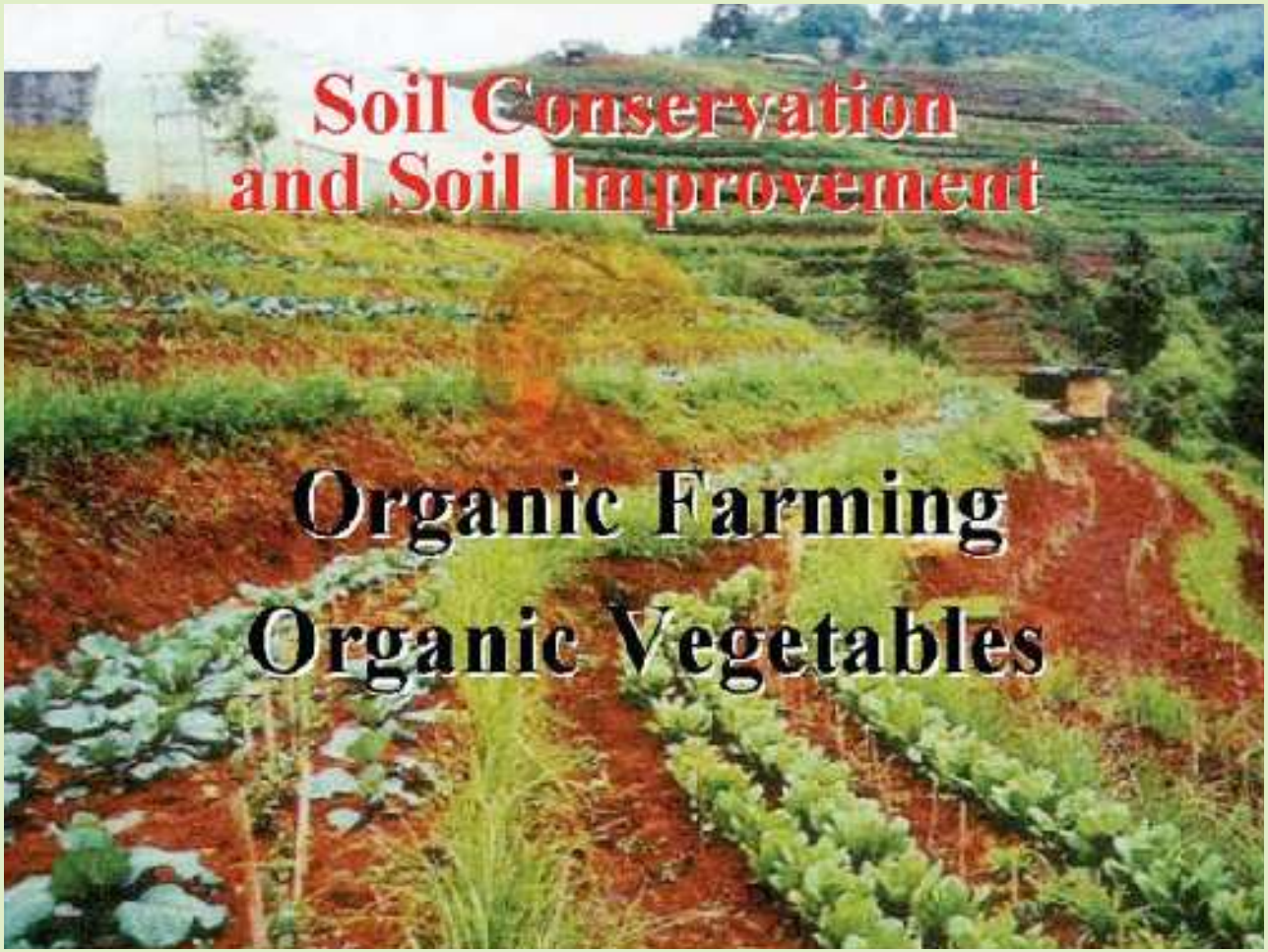
Above: One year old Tamarind, circled with vetiver (Chiang Rai Research Station, Thailand. Arbuscular mycorrhizal activity, associated with vetiver roots, results in better soil nutrient translocation at depth. The latter combined with improved soil moisture and more soil micro-fauna activity results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

Dune invasion of banana plantation (Les Niayes, Senegal)

Left: Before. Note condition of banana

Dune stabilized with one vetiver hedge

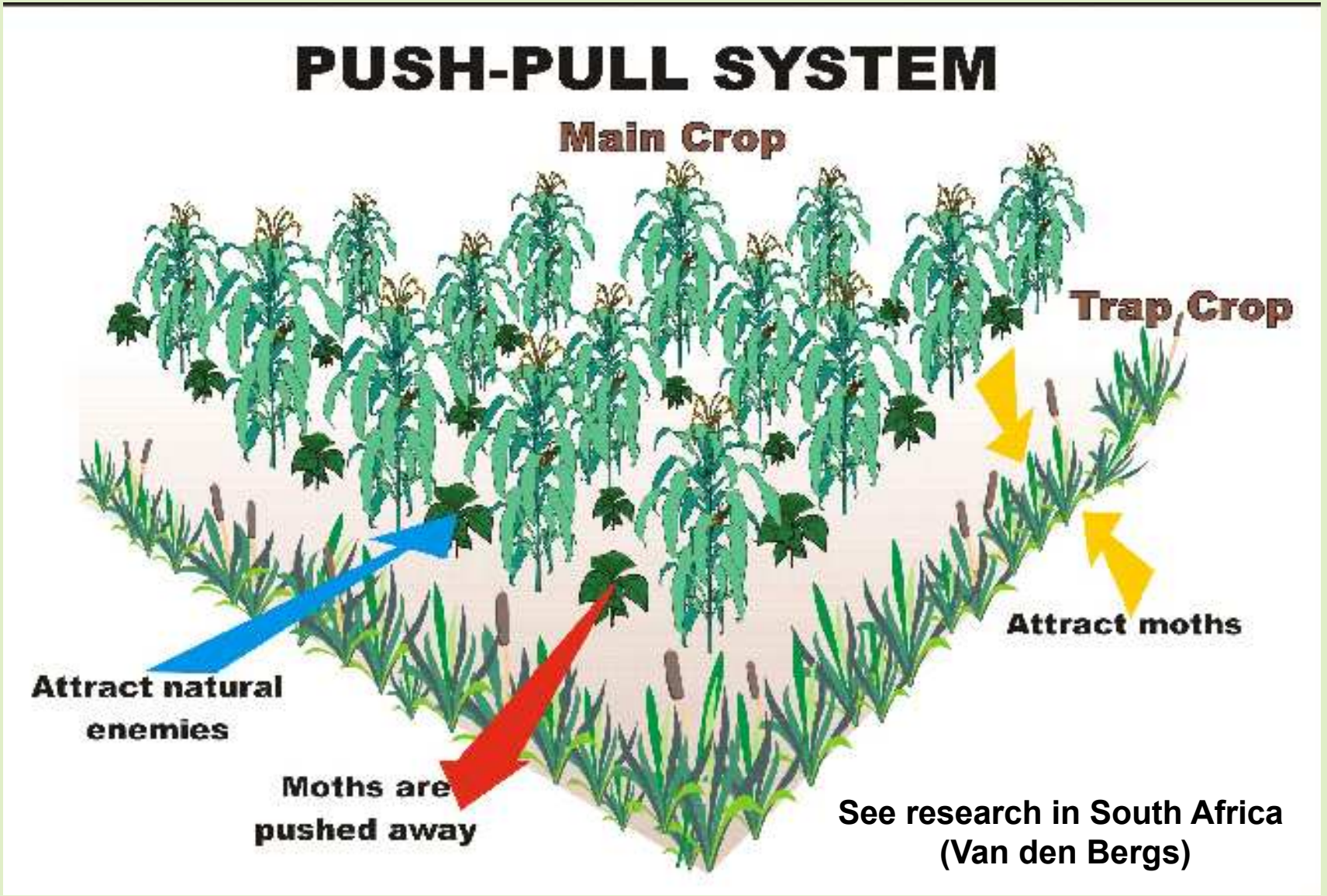
VS used in organic farming (Thailand)



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



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

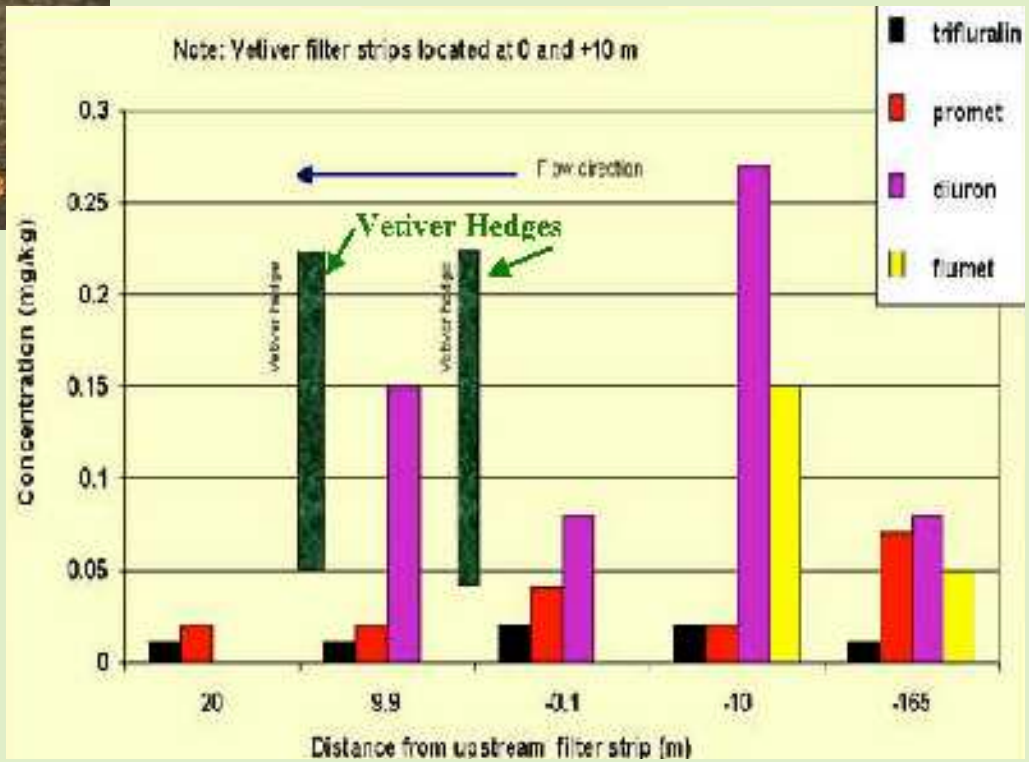
Vetiver feed values compared to other forage grasses

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

South Africa - Natal

Zimbabwe - Hippo Valley

Farm dam stabilization and protection

Left: 6 months after planting with vetiver.

Right: I 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.