



Terra Preta



Altes Wissen -
Moderne Lösung

biochar.org
BALANCE CARBON AND RESTORE SOIL FERTILITY

Christoph Steiner



Bodenfruchtbarkeit Tropen

- Schnelle Erschöpfung der Nährstoffe und organischen Substanz
- Saure Boeden und wenig KAK
- Ineffiziente Duengung und Duengemittel oft nicht verfügbar
- Krankheiten, Schädlinge und Unkraut



Terra Preta



Photo: Ilse Ackermann

Terra Preta fertility

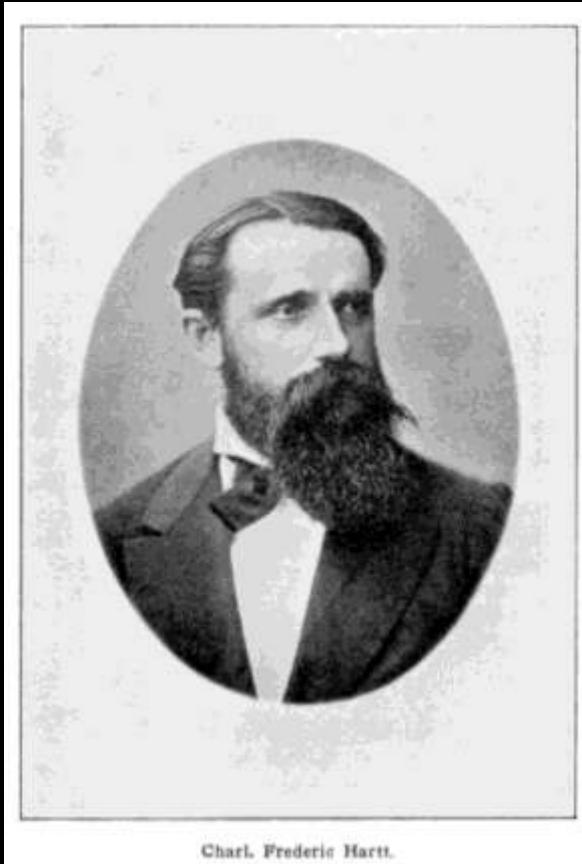


Terra Preta Geschichte frühe Zeugen

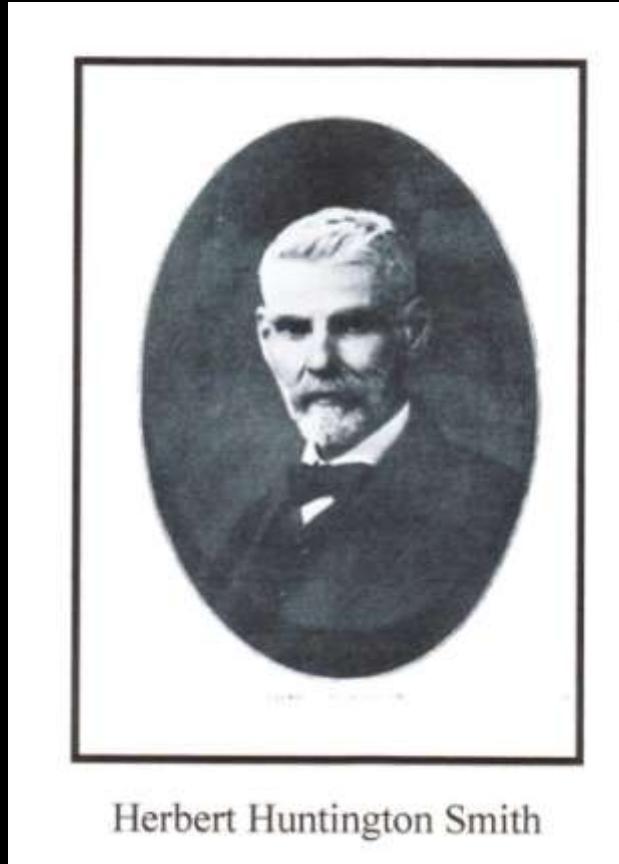


“...there could be seen very large cities that glistened in white [...] many roads that entered into the interior [...] and besides this, the land is as fertile [...] as our Spain”

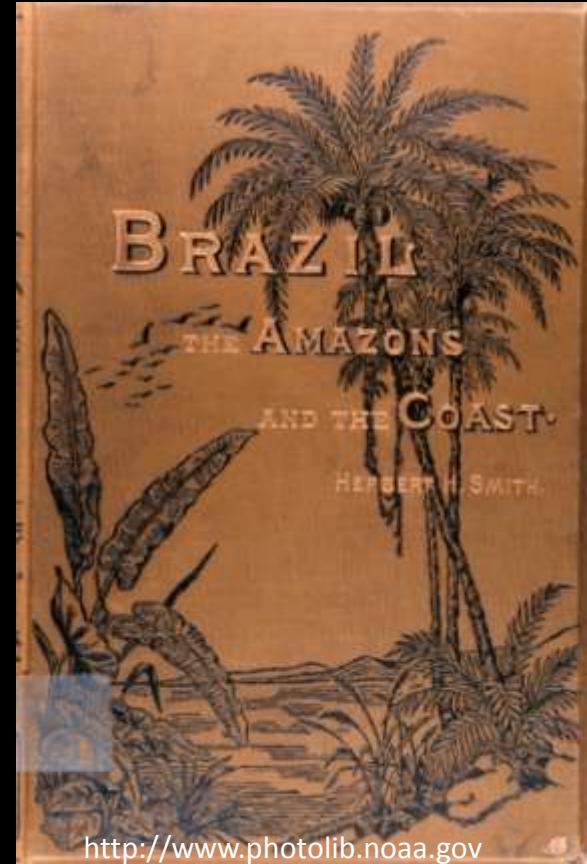
Terra Preta Geschichte fruehe Zeugen (1879)



Charl. Frederic Hartt.



Herbert Huntington Smith



<http://www.photolib.noaa.gov>

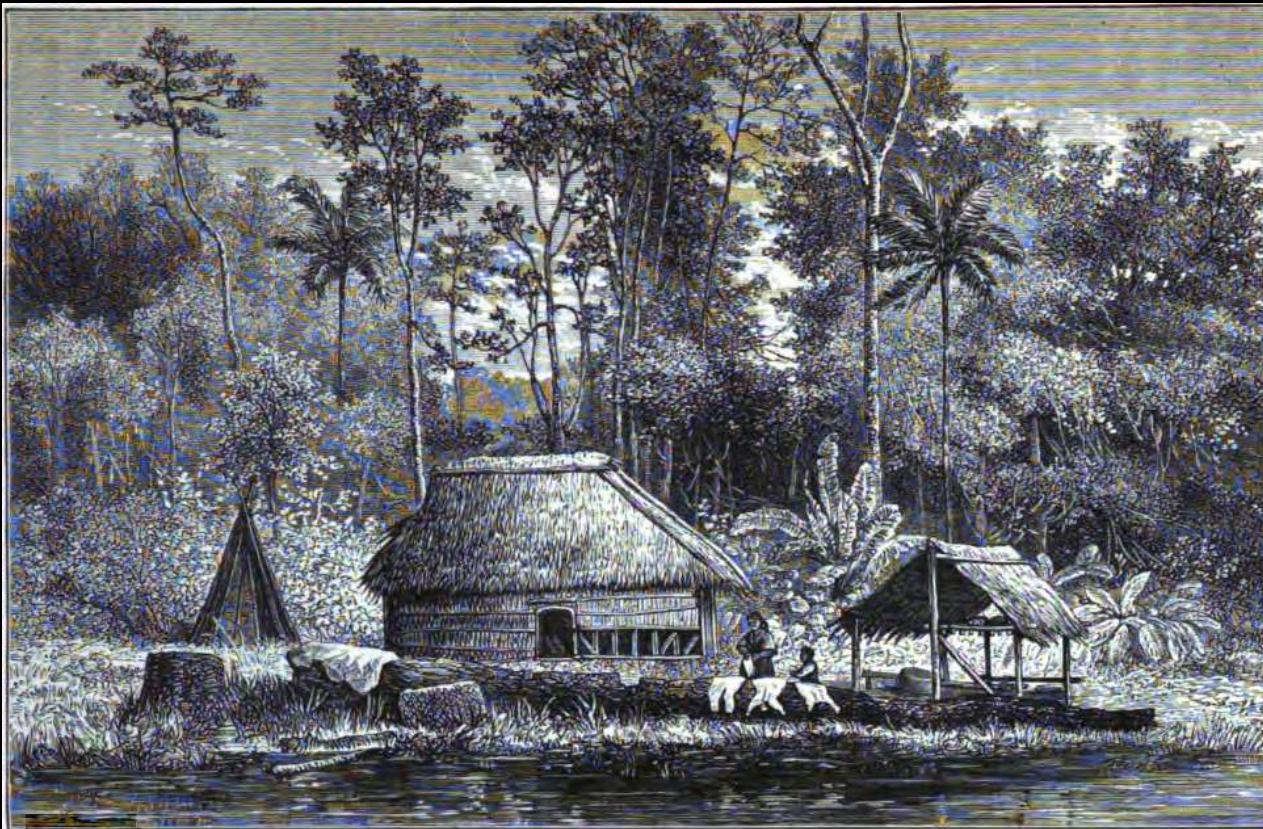
“... the bluff-land owes its richness to the refuse of a thousand kitchens for maybe a thousand years.”

“This is the rich terra preta, “black land,” the best on the Amazons. It is a fine, dark loam, a foot, and often two feet thick,everywhere we find fragments of Indian pottery, so abundant in some places that they almost cover the ground.”

Terra Preta Geschichte fruehe Zeugen

C. Barrington Brown (1839-1917)

“In two places also, in the forest, were the sites of ancient villages, marked by a deep black soil mixed with broken pottery” (Brown 1876:339);



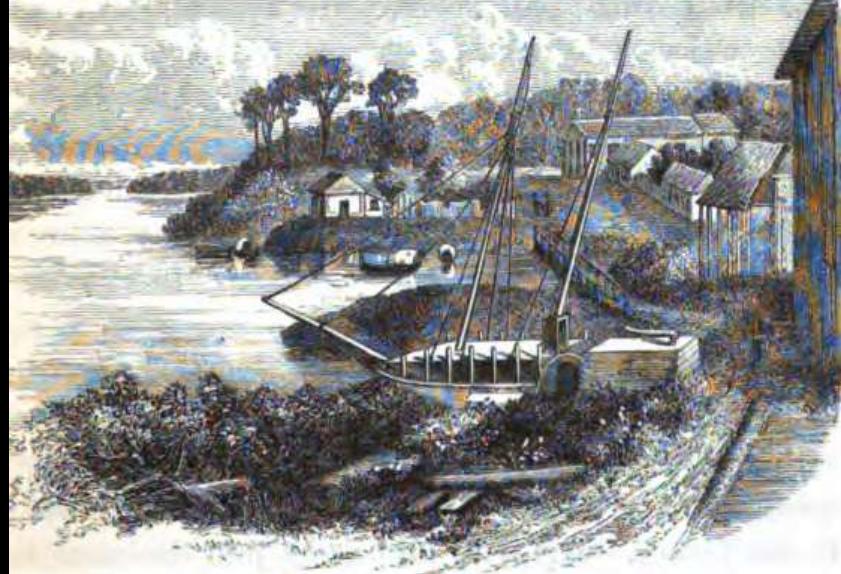
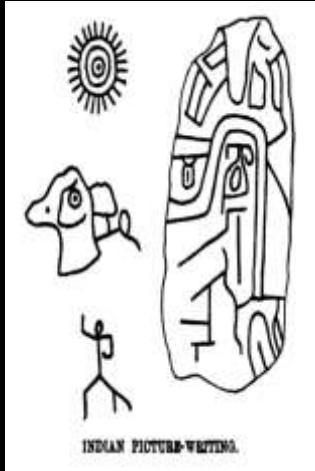
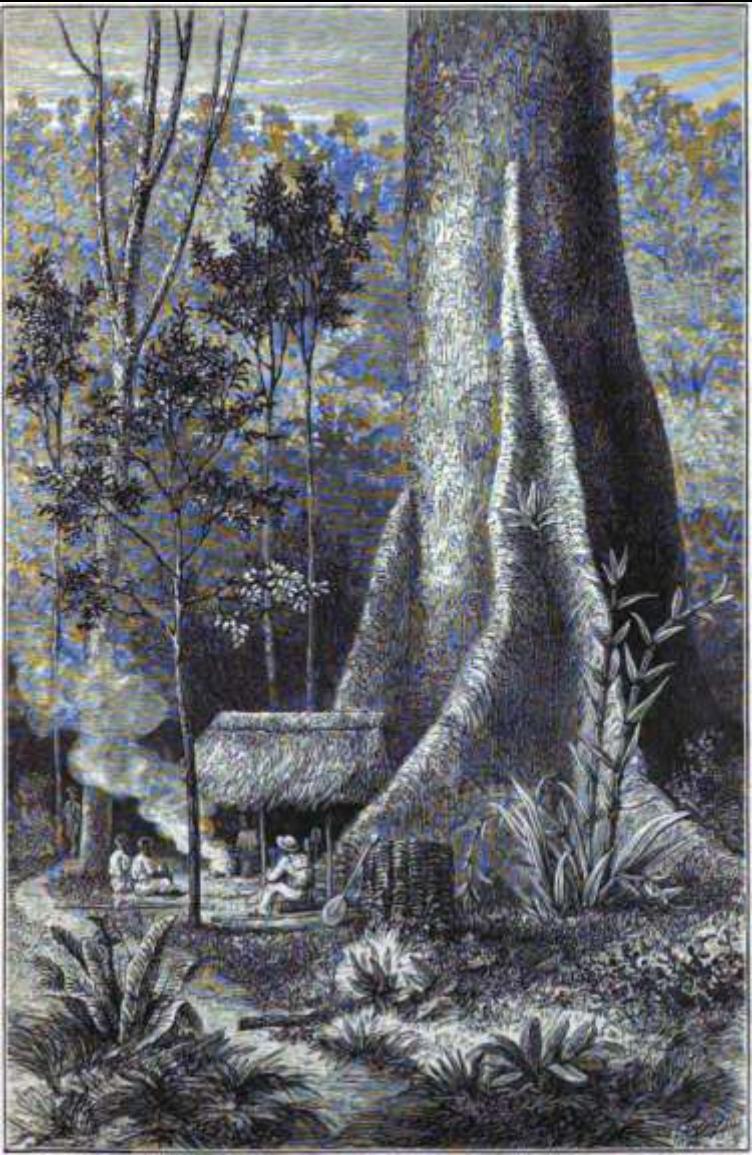
Terra Preta Fifteen Thousand Miles on the Amazon and its Tributaries, Charles Barrington Brown and William Lidstone, E. Stanford, 1878, 520 pages (<http://books.google.com>)

"undoubtedly of artificial origin ...highly prized as agricultural grounds, owing to their fertility; and they bear the name of "Terras pretas"



In this publication Brown and Lidstone were apparently the first to use the term *terra preta* ("terras pretas") in print.

Terra Preta History early descriptions



“the spot, like that on many other elevations bordering the Amazon and its branches, was the favourite dwelling-place of Indians in bygone days; . . .”

“Villages must have stood upon these spots for ages, to have accumulated such a depth of soil about them; and probably their original founders were of a race that has now completely vanished.”

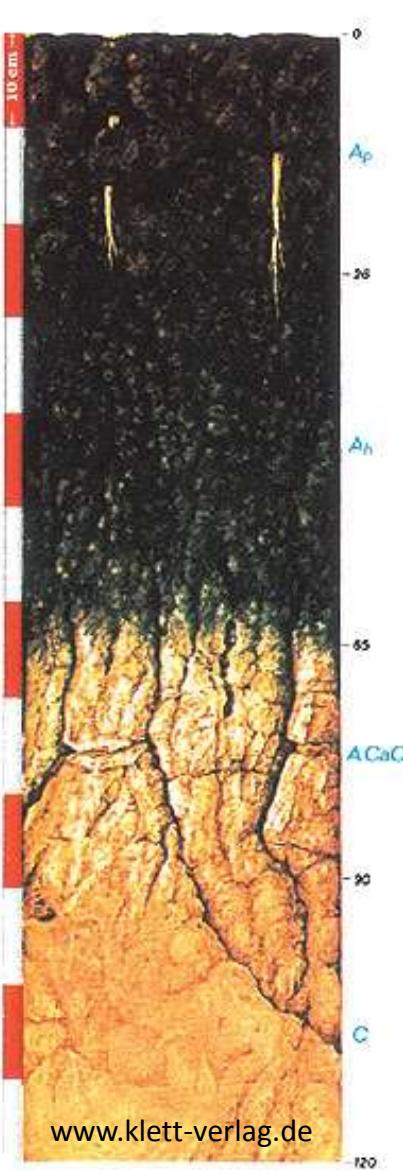
Terra Preta Friedrich Katzer (1861 – 1925)



“....the region's more distinguished wealth lies in its soil....”

- Erste Laboranalysen
- Erkannte den hohen Gehalt an organischer Substanz
- Im Unterschied zu Chernozems ist Terra Preta von Menschen gemacht
- Terra Preta besteht aus Boden gemischt mit verkohlter und zersetzer Biomasse.

Chernozem BC



- Die produktivsten Boeden (*Duchaufour, 1998*)
(5. 12. 2004 world soil day, "Schwarzerde" = Boden des Jahres 2005)
- Rueckstende von Vegetationsbraenden BC (*Glaser et al., 2000*)
- BC macht bis zu 35% der OS aus (*Skjemstad et al., 2002*)
- BC ist einige tausend Jahre alt (*Schmidt et al., 2002*)

Anthrosols Brasilien – Terra Preta



Terra Preta fertility

Cash crop Anbau



bewässerter Gartenbau

Rollrasen

Terra Preta Pflanzenkohle



Terra Preta Nova



Experimento Terra Preta Nova



EMBRAPA research station Brazil

Holzkohle Produktion and Verwendung



Holzkohle Produktion



Holzkohle “Abfall”



Holzkohle Kultursubstrat



Photos:
Gilvan Martins,
Embrapa, Brazil



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Gilvan Martins,
Embrapa, Brazil

Holzkohle Kultursubstrat



Holzkohle Kultursubstrat



Terra Preta Herstellung?



Holzkohle Anwendung USA und Europa (1846)

Elad et al. 2010,
Phytopathology
BRIEF COMPEND

"Charcoal absorbs and condenses the nutritive gases within its pores."

Charcoal often checks rust in wheat, and mildew in other crops"

o p
AMERICAN
AGRICULTURE.
Steiner et al. 2010,
J. Environ. Qual.
BY R. L. ALLEN.

"Ammoniacal liquor holds large quantities of nitrogen,...charcoal dust may be added, ..the charcoal soon combine with the ammonia, ..it is a powerful manure,"

"Guano should be mixed with twice its bulk of charcoal dust"

Charcoal should be added to liquid manure to absorb the ammonia"

"Poudrette is the name given to the human faeces after they have been mixed with charcoal dust.."

"A dressing of charcoal has in many instances, been found so beneficial that it has been extensively introduced in France for the wheat crop"

Danny Day
and others

"The turnep (*Brassica rapa*). Charcoal dust applied in the same way has been found to increase the early growth from four to ten-fold."

Holzkohle Beständigkeit



Historische Pyrolyse Pechölsteine und Pechölbrennenc



Historische Pyrolyse Pechölsteine und Pechölbrennen



Fotos: Anita Buchart
Actor: Friedrich Frühwirth





International Biochar Initiative



IAI Conference 2007, Terrigal, Australia



IBI Conference 2008, Newcastle, UK

Formed in 2006 at the World Soil Science Congress

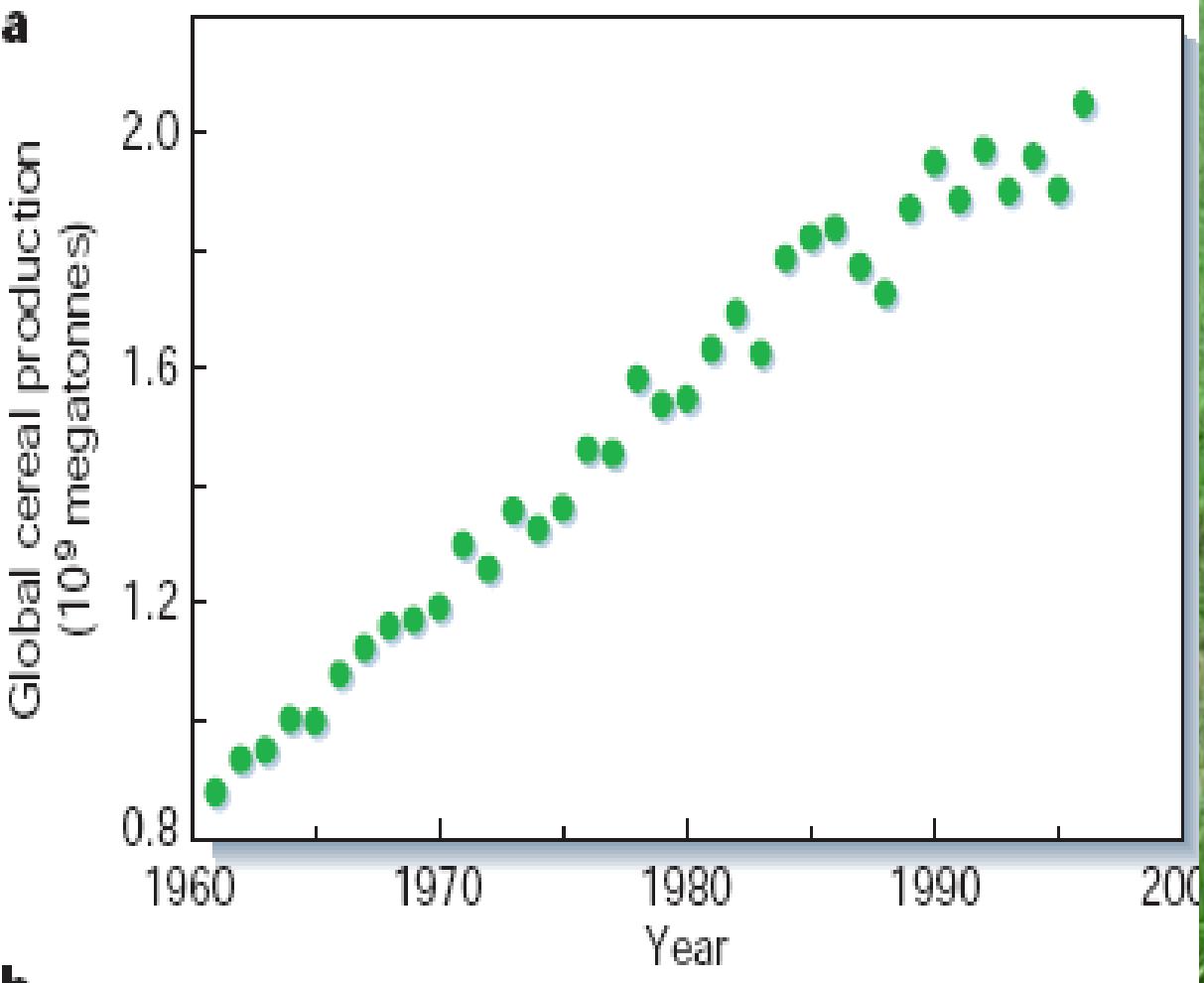
2010, Rio de Janeiro, Brazil

2012, Kyoto, Japan

34 Regional Biochar Groups according to IBI

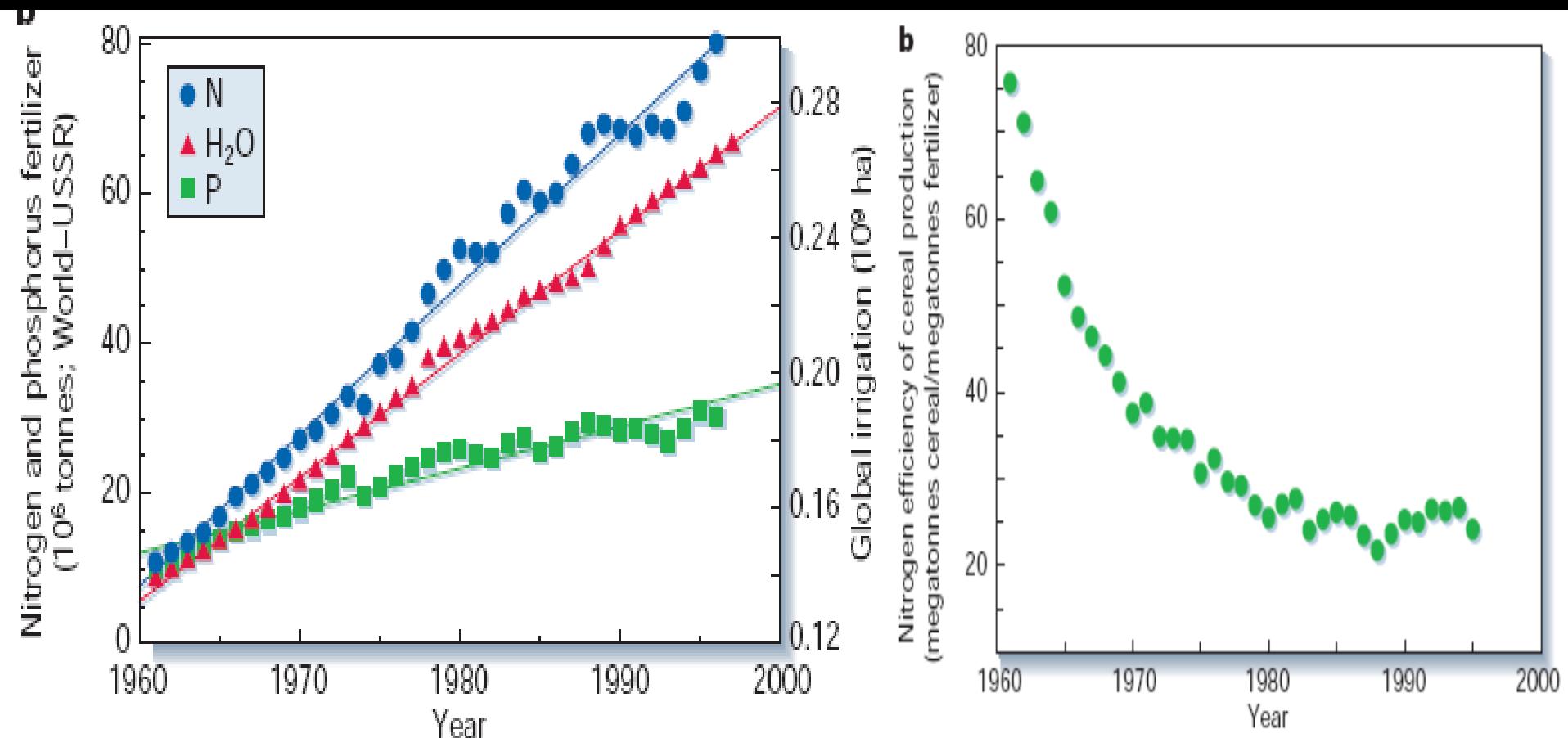


Landwirtschaftliche Herausforderungen



Landwirtschaftliche Herausforderungen

Düngemittel



Landwirtschaftliche Herausforderungen



In 50 Jahren wird doppelt so viel Nahrung gebraucht als Heute!

- weiterer Verlust von einer Milliarde ha natuerlicher Habitate
- Eutrophierung von Gewaessern
- Freisetzung von Treibhausgasen

Landwirtschaftliche Beschränkungen

Wie kann die landwirtschaftliche Produktion (nachhaltig) verdoppelt werden?

- In Anbetracht von:
 - Klimawandel
 - “peak oil”
 - “peak Phosphor”
 - Bodenverlust und Degradation
 - Wasserversorgung
 - Verlust der Biodiversitaet
 - Biotreibstoffe und Biobrennstoffe

“A greener revolution is needed”

Tilman et al. 2001, Science

- Bodenschutz
- Geschlossene Nährstoffkreisläufe
- Soffstrommanagement mit Kohlenstoff und Nährstoffen
- Effizientere Düngung
- Klimaschutz und Klimaanpassung