

Eleventh Edition



Environmental Science
A Global Concern

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Farming: Conventional and Sustainable Practices

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6 Components of Soil

Sand and gravel

Silt and clay

Dead organic material

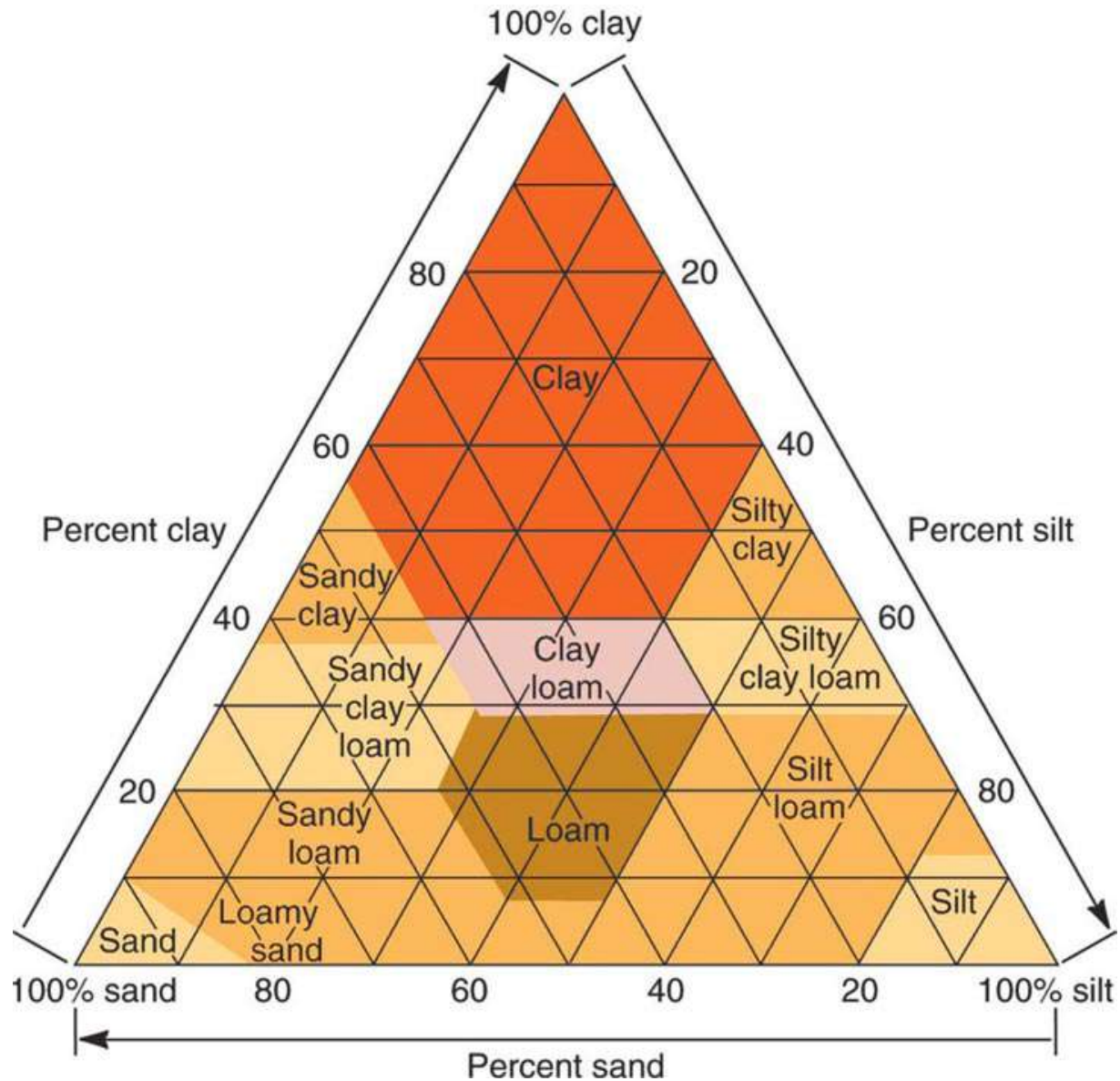
Soil fauna and flora

Water

Air

Soil Texture Pyramid

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Grassland vs. Tropical Rainforest Soils

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(a)



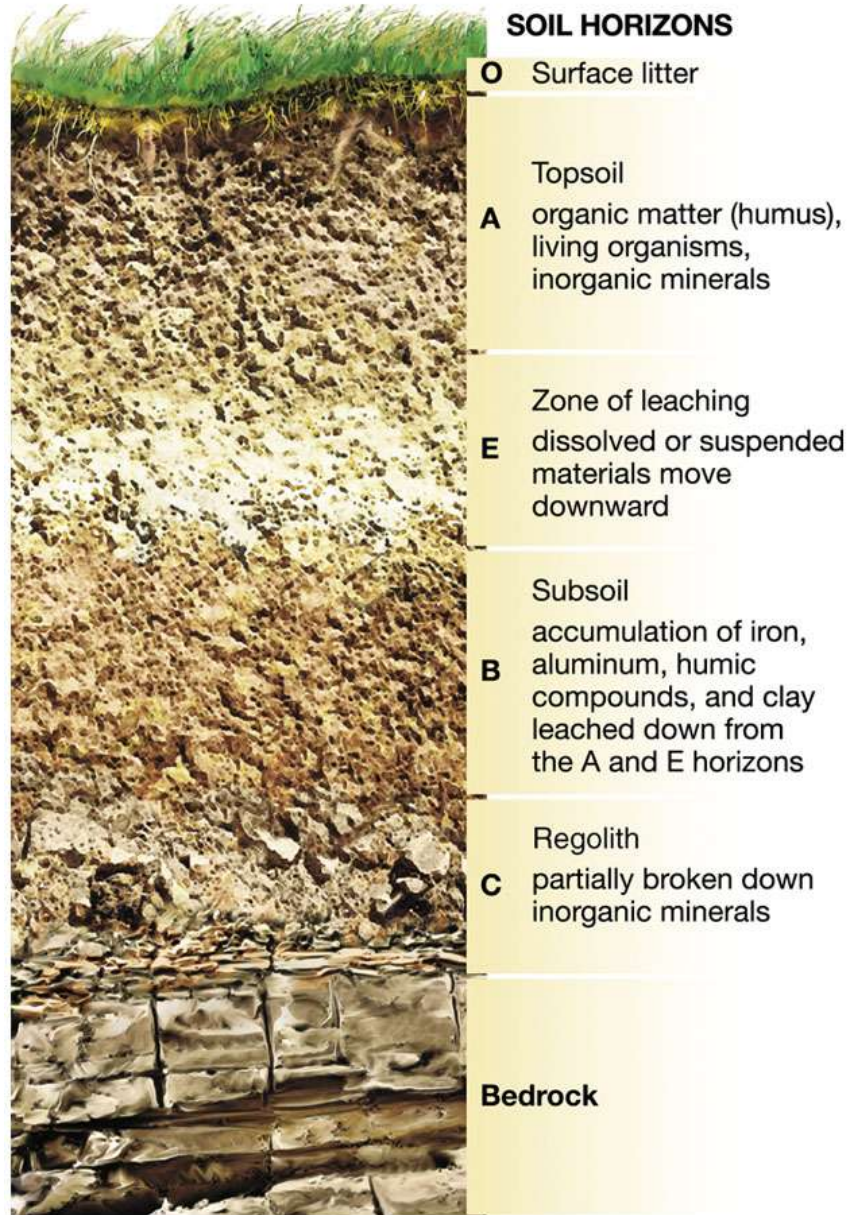
(b)

Courtesy USDA/NSCC

Soil Ecosystems

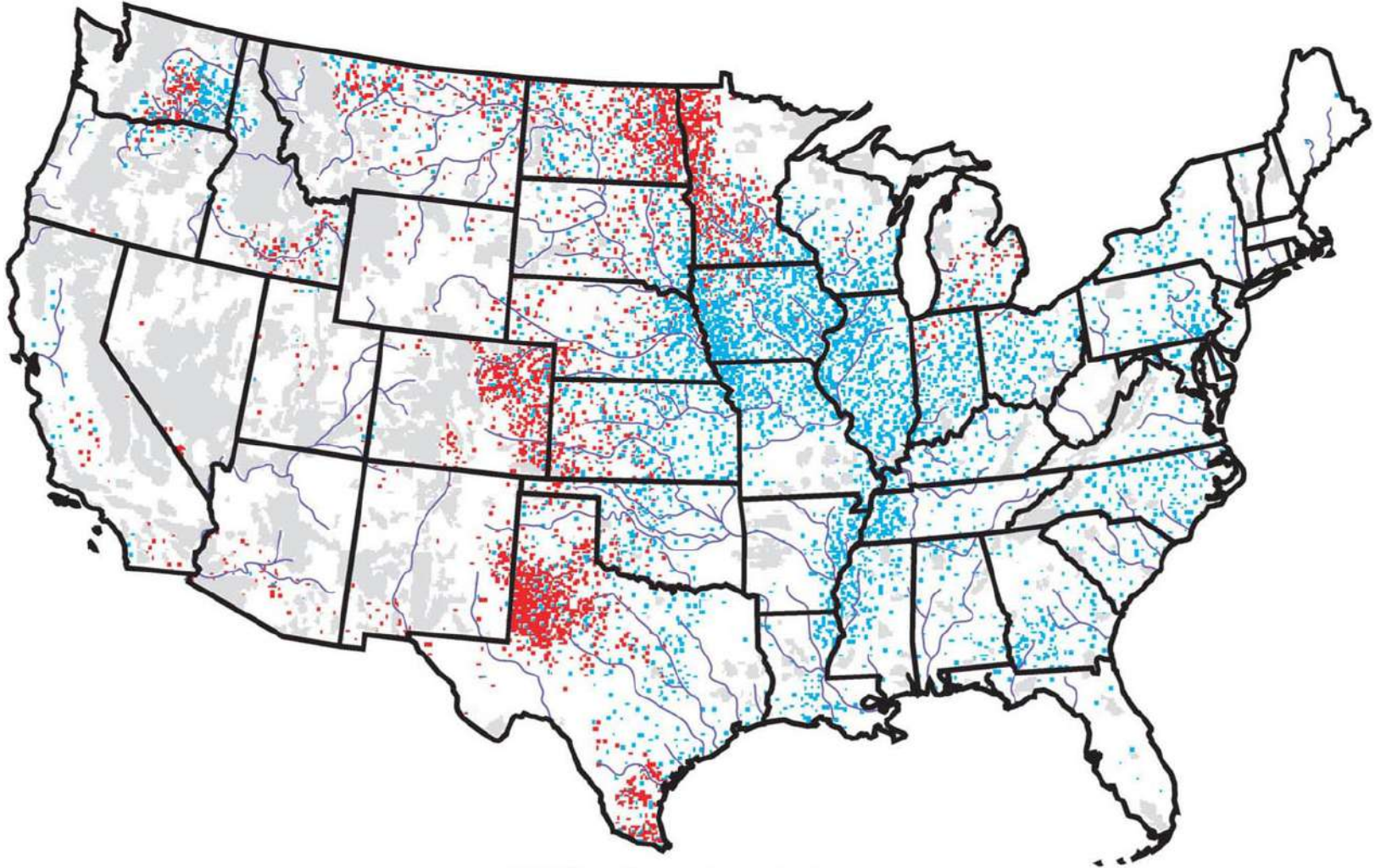
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Distribution of US Cropland

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USDA Natural Resource Conservation Service

Water Moves Soil in Various Ways

Sheet Erosion - thin layer of surface removed

Rill Erosion - small rivulets of running water gather together and cut small channels

Gully Erosion - rills enlarge to form bigger channels too large to be removed by normal tillage

Streambank Erosion - washing away of soil from banks of streams and rivers

Desertification

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(a) Sheet and rill erosion
Photo by Lynn Betts, courtesy of USDA
Natural Resources Conservation Service



(b) Gully erosion
Photo by Jeff Vanuga, courtesy of USDA
Natural Resources Conservation Center



(c) Wind erosion and desertification
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Other Agricultural Resources

- All Plants Need Water to Grow
 - Waterlogging
 - Salinization

Pesticide Types

Chlorinated Hydrocarbons

Atrazine, Paradichlorobenzene (mothballs) and DDT are examples.

Persistent and concentrate in food chains

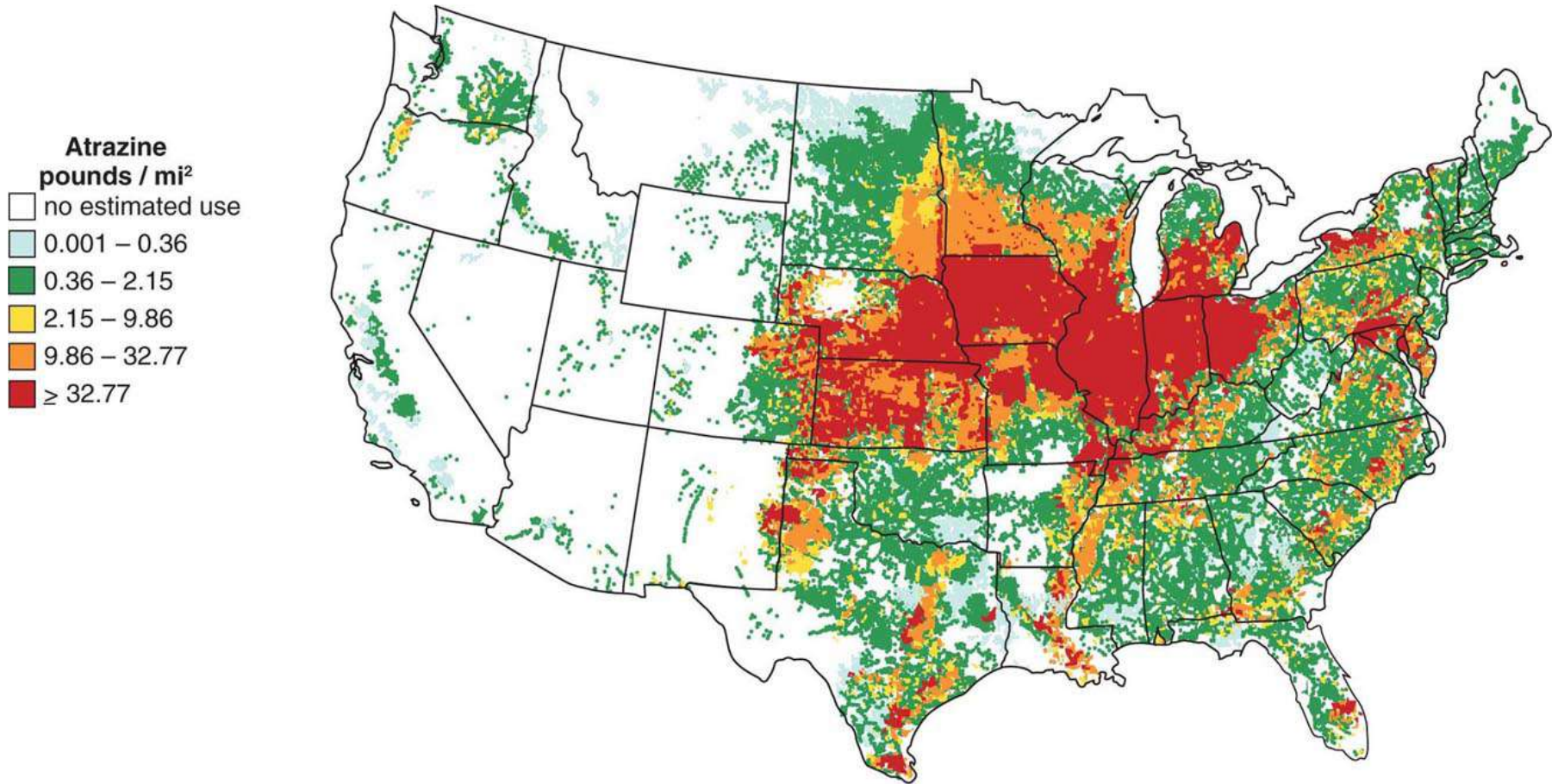
Fumigants

Used in fungus control on strawberries or to prevent insect/rodent damage to stored grains.

Extremely dangerous to workers and restricted or banned in some areas.

Map of Atrazine Usage in US

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Source: USDA

Pesticide Types

Microbial Agents and Biological Controls

Bacteria such as *Bacillus thuringiensis* kill beetles.
Parasitic wasps such as *Trichogramma* kill moths.
Ladybugs are used to control aphids

Environmental Effects of Pesticides

Non-Target Species

Up to 90% of pesticides never reach intended target and instead kill beneficial organisms.

Honey bees are one such example

Pest Resurgence

a few resistant pests survive the pesticide and survive to repopulate the area with more resistant pests.

Resistant pests require finding new pesticides

Persistent Organic Pollutants

Persistent Organic Pollutants (POP's) –

They can travel far from the point of dispersal.

Stored in fat and tend to **bioaccumulate**

High levels have been detected in predators at the upper levels of food chains

POP's accumulate in polar regions by the “grasshopper effect”; they evaporate from warm regions and condense in cold regions.

Health Hazards of Pesticide Usage

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Organic Produce

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Biological Controls

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Crop Vacuum Removes Insect Pests

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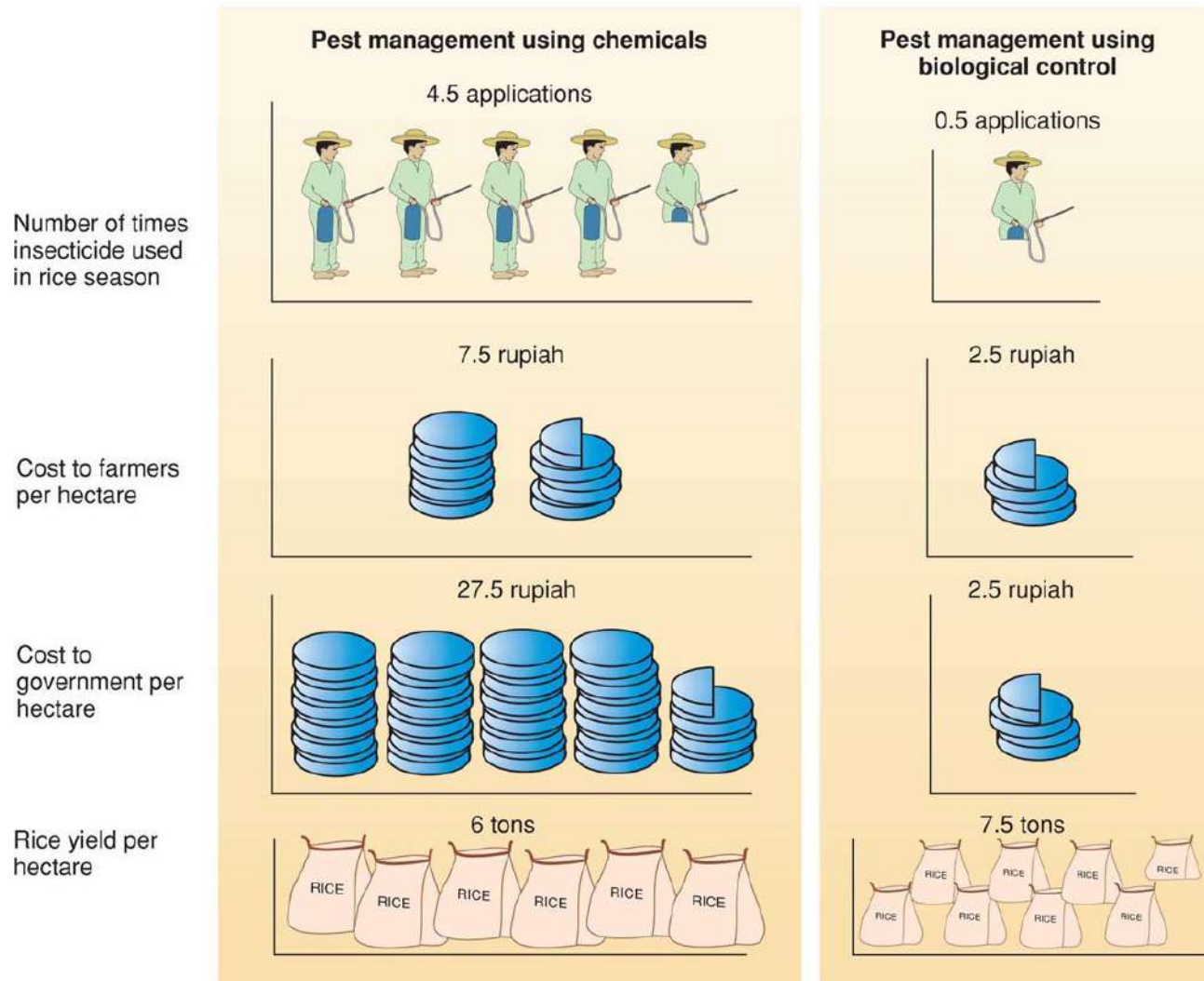


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Alternative Pest Control Strategies

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Alternative Pest Control Strategies



Source: Tolba, et al., World Environment, 1972-1992, p. 307, Chapman & Hall, 1992 United Nations Environment Programme

Soil Conservation

Managing Topography

Contour Plowing - plowing across slope to slow flow of water

Strip Farming - planting different crops in alternating strips along land contours

Terracing - shaping land to create level shelves of earth to hold water and soil

Plant **perennial** species.

Contour Plowing

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Terracing

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