Dynamics of an Agricultural Stream Ecosystem

Agricultural practices are diverse, and thus the impacts to stream ecosystems from agriculture are highly variable.

Hydrology: Agricultural practices can alter the movement of water in a watershed through: 1) sub-surface drains, which lower the water table and quickly route water to nearby streams; 2) ditches and straightening of headwater streams; and 3) irrigation, which supplements available water for crops. These changes can result in more rapid runoff, reduced streamflows during dry periods, and increased transport of sediment and chemicals.

Water Chemistry: Agricultural chemicals applied to fields can move to streams and groundwater; other sources of chemicals include irrigation water or waste from animal feeding operations. Nutrients--primarily nitrogen and phosphorus--in streams can exceed natural levels when fertilizer infiltrates through the soil or runs off the surface of the ground. Excess nutrients can cause nuisance growths of algae and aquatic plants, which when they die and decompose lead to low oxygen levels downstream. Pesticides are applied to control insect damage and growth of weeds or fungus but can also harm aquatic organisms.

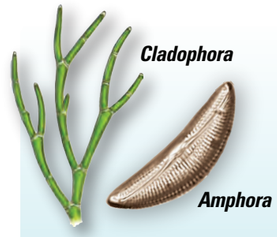
Illustration: Frank Ippolito©

Physical habitat: Some agricultural practices reduce the quality of stream habitats and have negative effects on organisms. Straightening and dredging headwater streams removes living spaces for aquatic organisms. Removal of riparian trees and shrubs results in more sunlight and warmer water temperatures. Soil disturbances from conventional tillage or overgrazing can cause erosion, resulting in buildup of sediment in the stream channel.

green sunfish

stoneroller

Fish communities of agricultural streams may be dominated by species – such as the central stoneroller – that graze on algae attached to rocks and other submerged surfaces. Green sunfish are tolerant to high turbidity, siltation, and temperature.



Algae may proliferate in agricultural streams with high nutrient concentrations and available sunlight. *Cladophora* (a type of green algae that grows in long filaments) and *Amphora* (a diatom) are examples of algae that can reach nuisance levels, occurring as large clumps or floating mats; as these mats are transported downstream and decompose, they can contribute to low levels of oxygen that are harmful to other aquatic life.

caddisfly

mayfly

Macroinvertebrates that consume algae or organic-matter particles can thrive in some agricultural streams, whereas those that are sensitive to siltation may decline. Net-spinning caddisflies of the family Hydropsychidae are filter feeders that collect and ingest organic particles that are suspended in the water; these particles may originate from crop residues, animal wastes, or algae as they gradually decompose. The triangular gill covers of this mayfly (*Tricorythodes*) protect the sensitive oxygen-gathering gills from silt in sediment-laden streams.