Bölüm 6

SUCUL EKOSİSTEMLERDE MAKROFİT MİKROORGANİZMA İLİŞKİLERİ VE BU İLİŞKİLERİN ÇEVRESEL ETKİLERİ

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GİRİŞ

Sulak alanlar; zengin bitkisel ve hayvansal organizmalara barınak sağlayan, üzerindeki sığ su tabakası sayesinde suyla doymuş toprağa sahip olup, karasal ve sucul ortamlar arasında bir geçiş zonu olarak karakterize edilirler.

Tatlı su ekosistemlerindeki bitkisel organizmalar; fitoplankton, diatom ve diğer algler gibi mikrofitlerle, makrofitlerden oluşmaktadır. "Makrofit" terimi; kısmen ya da tamamen su içinde yaşayan ve çıplak gözle görülebilen bitkileri ifade etmek için kullanılır(1,2). Makrofitler taksonomik olarak; phanerogam, pteridophyte, bryophyte ve makroskobik algleri içeir(2-4). Yaşam formlarına göre ise; su üstü, su altı, serbest yüzen ve yüzen yapraklı makrofitler olarak gruplandırılırlar.

Yüzey sularının temel olarak, makrofit ve mikrofitlerin büyüyebilmesi için, organik karbona ek olarak azot, fosfat ve diğer makro-nutrientleri içermeleri gerekmektedir(5). Bu sularda mako ve mikrofitlerin yanı sıra, genellikle mikrobiyal döküntüler, biyofilm ve planktonik makroalg-bakteri toplulukları şeklinde gözlemlenen mikrobiyal bileşenler de vardır(6,7). Sucul ortamlarda bakteri gelişimi genellikle bir yüzeye bağlı (biyofilm) olarak meydana gelir(8). Biyofilm oluşumu sadece cansız yüzeylerde değil, aynı zamanda sucul bitkiler üzerinde de gerçekleşir(9). Biyofilm şeklindeki mikrobiyal topluluklar çoğunlukla, su altı bitkilerinin rizosferinde (kök çevresi), özellikle de rizoplan (kökün temas yüzeyi) bölgesinde ve sedimentin katı yüzeyinde bulunur. Değişik çevresel koşullar, örneğin; ötrofikasyon(10) ve sudaki toksik maddeler biyofilmi ve biyofilmin yapısını etkiler(11).

Tatlı su sistemlerinin su kalitesi doğal bozulma, ötrofikasyon ve insan aktivitelerinin etkisine göre değerlendirilmektedir. Akuatik kirlilikle ilgili çok sayıda çalışma vardır(12-14) ve kirliliğin biyolojik giderimiyle ilgili referanslar da(15-16) su kirliliği çalışmalarının içinde yer almaktadır.

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SONUÇ

Sucul ortamlarda özellikle kök yüzeyinde bitki mikroorganizma etkileşimi yoğun olarak görülür. Bitki büyümekte olan yumuşak dokularını korumak için, farklı organik maddeler (amino asit, polisakkarit, lipit, fenolik birleşikler, nükleik asit vb.) salgılar. Salgılanan bu maddeler mikroorganizmaları cezbeder. Bitki mikroorganizma etkileşiminin doğasında, pozitif ya da negatif gelişmeler, etkileşimin şekline bağlı olarak oluşabilir. Buna ilaveten, çeşitli mikroorganizmalar birbirleriyle etkileşime girerek, biyofilm olarak adlandırılan bir mikrobiyal ağ oluştururlar. Bitki türlerinin ürettiği organik karbon ve kök yüzeylerindeki oksijen seviyesine bağlı olarak, üzerlerinde gelişen mikrobiyal birliğin yapısı da değişiklik gösterebilmektedir.

Derin sulardaki köklü makrofitler; radyal oksijen kaybı olarak bilinen, gövdeden köklere doğru gerçekleştirilen oksijen salınımının devamlılığını sağlamak zorundadırlar. Çünkü; gövdeden köke gönderilerek, kök yüzeyinden sedimente salınan oksijen sayesinde mikrobiyal ve kimyasal reaksiyonlar gerçekleşmektedir. Kök yüzeyindeki radyal oksijen kaybı, bu alanı elektron taşıma bölgesi haline getirir ve burada oksijen elektron alıcı görevi yaparak aerobik yaşamı destekler. Öte yandan, oksijenin düşük olduğu sedimentte ise; CO_2, CH_4^+ ve NO_3^- gibi elektron alıcıları bulunur ve bunlar da aneorobik yaşamı desteklerler.

Sucul ortamlarda kök yüzeyi birçok biyolojik ve fiziko-kimyasal reaksiyonun oluştuğu aktif bir zondur. Bu reaksiyonlardan bağımsız olarak; her bir makrofit türü kendine özgü bir mikrofloraya sahiptir ve bu ilişki ile her iki organizma da hayatta kalabilmek için; gerek besin maddelerinin kullanımı ve gerekse kirleticilerin uzaklaştırılması amacıyla, işbirliği yaparlar. Bir örnek vermek gerekirse; bakteri türleri poly-aromatik hidrokarbonları ayrıştırarak bitki büyümesi için gerekli olan Indol Asetik Asit (IAA) hormonunu sentezlerler (16).

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