FUNGI IN AN OVERFED ECOSYSTEM: A CASE OF GREAT CORMORANT COLONY IN PINE FOREST

Jurga Motiejūnaitė, Gražina Adamonytė, Mindaugas Dagys, Reda Iršénaitė, Tatjana Iznova, Audrius Kačergius, Jonas Kasparavičius, Ernestas Kutorga, Svetlana Markovskaja, Dalytė Matulevičiūtė, Dalia Pečiulytė, Ričardas Taraškevičius

The research was funded by a grants no. LEK-23/2010 and LEK-03/2012 from the Research Council of Lithuania
The study was performed in the oldest and largest colony of great cormorants in Lithuania (Juodkrantė, Curonian Spit), established in 1989 in a Scots pine forest, growing on nutrient-poor sandy dune soils. Permanent sampling plots were established inside the colony under varying bird influence (yellow to red) as well as in close-laying reference areas (green).
At present the cormorant colony occupies, together with a small, stable colony of grey herons (*Ardea cinerea*), over 3300 nests in an area of coniferous forest more than 700 x 370 m in size. The colony is very dynamic, it was intensively spreading during the last 10 years, leaving large areas of forest dead or dying.
Chemical and mechanical impact of the birds change whole forest plant community and properties of all substrates for fungi:

Oligotrophic pine forest vegetation die away and is replaced by *Sambucus* spp. shrubs, eutrophic ruderal and alien herbaceous plant species.

In three years after the nests move into the forest, moss cover dissapear, the forest floor consists of twigs, needles and bird debris intermixed with guano.
Fruiting fungus species diversity decreased dramatically in the colony parts on dune terraces (A), though the oldest part of the colony (now abandoned) in more humid dune hollow bore rather high species diversity. Trophic structure of mycobiota in all parts of the colony was very different from the one characteristic to pristine forests (B): saprobic species became overwhelmingly predominant, number and occurrence of pathogens increased, and presence of coprophilous fungi became very evident, besides, they inhabited uncharacteristic substrata (from Kutorga et al., 2013).
SOIL FUNGI

Micromycetes

Actinomycetes

Numbers of CFU of soil micromycetes (grown in CDA (blue stocks) and LCA (purple stocks) media and of actinomycetes from the soil samples inside the colony (A-D) and reference plots (E and F).

ECM Morphotypes

ECM species

Numbers of ECM morphotypes and identified ECM species from the soil samples inside the colony (A-D) and reference plots (E and F).
For lichens, the bird influence resulted in decrease of total number of lichen species in the colony (A) as well as dramatic change in lichen communities (B: green area – reference, red area – colony; modified from Motiejūnaitė et al., 2014).
In myxomycetes, like in fungi, general diversity of species was lowest in the most active part of the colony (A) and presence of coprophilous species was uncharacteristically high. Species distribution pattern (B) was rather complicated showing tripole gradient: 1) transition from oligotrophic to eutrophic habitat (green arrow); 2) transition from limited substrata, high levels of nutrients and pH to high diversity of substrata, high levels of nutrients and pH (red); 3) transition from lower diversity of substrata, low nutrients and pH to high diversity of substrata, high levels of nutrients and pH (yellow) (modified from Adomaitytė et al., 2013).
The result of long-term ornithogenic influence on lichens were nitrophytic (0), often monospecific lichen communities. Early effect manifestated as communities consisting of algae (0) with predominating *Desmococcus olivaceus* and the crucial point of transition from acydophytic pine epiphytes (0) was depauperised community (0) consisting of three acidophytic species, of which *Coenogonium pineti* seemed to favour short-time increase of nutrients (*modified from Motiejūnaitė et al., 2014*).
While the colony was spreading onto former (of the year 2010) reference zone (E), diversity of fruiting ectomycorrhizal fungi decreased, meanwhile belowground ECM processes were less obvious.
Thank you for your attention!