Mid Atlantic Mosquito Control Association

2013 Conference Notes

Student Presentation: Testing Hypotheses for Aedes japonicus Invasion Using Community Ecology – T. Zachary Freed

a) Supposes non-equal competition
b) Applied to container breeding larvae
c) Aedes albopictus is a superior competitor
d) Hypotheses for coexistence
    i) Keystone predation
        (1) Toxorhychytes rutilus feeds disproportionately on the superior competitor
        (2) Relieves effects of competition
    ii) Spatial segregation - Ives 1988
        (1) Patch segregation - refuges
        (2) Intraspecies aggregation is greater than interspecies aggregation
    iii) Fluctuating resources
        (1) Highly variable spatial or temporal inputs of resources relieve competition
        (2) Refuges provided for inferior competitors
e) Methodology
    i) Lab experiment
        (1) Varying densities of Ae japonicus and competitor
        (2) Presence or absence of Tx rutilus larva
        (3) 3 replicates
        (4) Measured per capita rate of population increase and contributing fitness correlates
    ii) Field survey
        (1) Two habitat types
            (a) Tree holes - 5 sites
            (b) Used tires - 6 sites
        (2) Controlled for edge effects
        (3) Recorded abundances of
            (a) Ae japonicus
            (b) Ae albopictus
            (c) Oc triseriatus
            (d) Presence of Tx rutilus
        (4) Recorded resource amounts
        (5) Calculated aggregation at the individual container level
f) Results
    i) Keystone predation
        (1) Predation negatively affected both species
        (2) Japonicus is an inferior competitor to albopictus
        (3) With albopictus present, Tox did not positively impact japonicus - NOT Keystone predation
    ii) Mosquito abundance by field site
        (1) Tires produced more mosquitoes than tree holes

(2) Japonicus does not do well in tires that contain albopictus
(3) Indirect support for fluctuating resource hypothesis

iii) Aggregation
(1) Both species clump around some kind of distribution
(2) Low amount of interspecific aggregation
(3) Provides strong observational evidence for aggregation

g) Conclusions
i) Albopictus is a superior competitor
ii) Keystone predation hypothesis does not hold
iii) Japonicus and albopictus aggregate separately - sufficient for coexistence
iv) Tox may be a a greater barrier to invasion than competition by albopictus
v) Oc triseriatus and Ae japonicus have equal competition so can coexist