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Anopheles larval abundance and diversity in three rice agro-village complexes Mwea irrigation scheme, central Kenya.

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Source

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Abstract

BACKGROUND:

The diversity and abundance of Anopheles larvae has significant influence on the resulting adult mosquito population and hence the dynamics of malaria transmission. Studies were conducted to examine larval habitat dynamics and ecological factors affecting survivorship of aquatic stages of malaria vectors in three agro-ecological settings in Mwea, Kenya.

METHODS:

Three villages were selected based on rice husbandry and water management practices. Aquatic habitats in the 3 villages representing planned rice cultivation (Mbui Njeru), unplanned rice cultivation (Kiamachiri) and non-irrigated (Murinduko) agro-ecosystems were sampled every 2 weeks to generate stage-specific estimates of mosquito larval densities, relative abundance and diversity. Records of distance to the nearest homestead, vegetation coverage, surface debris, turbidity, habitat stability, habitat type, rice growth stage, number of rice tillers and percent Azolla cover were taken for each habitat.

RESULTS:

Captures of early, late instars and pupae accounted for 78.2%, 10.9% and 10.8% of the total Anopheles immatures sampled (n = 29,252), respectively. There were significant differences in larval abundance between 3 agro-ecosystems. The village with 'planned' rice cultivation had relatively lower Anopheles larval densities compared to the villages where 'unplanned' or non-irrigated. Similarly, species composition and richness was higher in the two villages with either 'unplanned' or limited rice cultivation, an indication of the importance of land use patterns on diversity of larval habitat types. Rice fields and associated canals were the most productive habitat types while water pools and puddles were important for short periods during the rainy season. Multiple logistic regression analysis showed that presence of other invertebrates,

percentage Azolla cover, distance to nearest homestead, depth and water turbidity were the best predictors for Anopheles mosquito larval abundance.

CONCLUSION:

These results suggest that agricultural practices have significant influence on mosquito species diversity and abundance and that certain habitat characteristics favor production of malaria vectors. These factors should be considered when implementing larval control strategies which should be targeted based on habitat productivity and water management.