ICHTHYODIVERSITY IN RICE AGROECOSYSTEM IN SEBERANG PERAI TENGAH, PULAU PINANG, MALAYSIA.

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DEDICATIONS

This thesis is dedicated to:

MY LATE FATHER, MOHD NASER BIN A. BAKAR
MY MOTHER, JAMILAH BINTI ISMAIL
BROTHER, MOHAMAD AMIRUL
SISTER, SITI AMIRAH,
SISTER, SITI AISHA,
SISTER, SITI AZIRA

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in fulfilment of the requirement for the degree of Master of Science

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Fish dynamic studies in rice agroecosystem are still lacking in Peninsular Malaysia. This study aim to explore the community structure of fishes in rice agroecosystem in different stages, habitat and seasons of paddy planting. Multiple sampling gears were used, including cast net, gill net and scoop net. Twenty-six species of fishes were recorded from 14 families, dominated by Cyprinidae, followed by Osphronemidae, Bagridae and Clariidae. Fish communities based on rank abundance curves possess log normal distribution. Species diversity, species richness and species evenness in both seasons were similar but species richness between seasons did not have significant differences. Species diversity is the highest at reproductive (Shannon; 1.83 ± 0.17 and 1.93 ± 0.10) while, species evenness is the highest at vegetative (Evenness; 0.70 ± 0.10 and 0.69 ± 0.10) but species richness is the highest at the ripening stage (Margalef; 1.81 ± 0.57 and 2.98 ± 0.21). Species diversity and evenness were the highest in the river meanwhile species richness is higher in the concrete canals and earth ditches. The significant difference ($p < 0.05$) of species richness was observed between both seasons across all stages in all habitats except river during vegetative and reproductive stage. Fish taxonomic diversity at all stages and habitats did not have significant differences ($p > 0.05$). However, dendrogram and nMDS results showed that fish assemblages were separated into two groups (69% similarity) and three groups (80% similarity). Fish assemblages were also

differences between habitats. ANOSIM demonstrated that the first two stages of paddy planting had fair similarity (R statistic value = 0.5) to each other, but the ripening stage was not similar to vegetative and reproductive stages (R statistic value = 1). Fish assemblages in the habitats were also different to each other (R statistic value = 1). SIMPER result shows that the similarity values between each stage and habitat were contributed by species that has higher abundance throughout the paddy planting season. The findings of this study had added new information on fish dynamics in rice agroecosystem and crucial on the utilization of rice field for integrated farming and generate incomes for the local communities.

IKTIODIVERSITI DI AGROEKOSISTEM PADI DI SEBERANG PERAI TENGAH, PULAU PINANG, MALAYSIA

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Pusat Pengajian   **: Pusat Pengajian Sains Marin dan Sekitaran**

Dinamik ikan di kawasan sawah padi masih kurang dikaji terutama di Semenanjung Malaysia. Kajian ini bertujuan mengkaji struktur komuniti ikan di ekosistem sawah padi berdasarkan fasa, habitat serta musim penanaman padi yang berbeza. Pelbagai alat persampelan telah digunakan seperti jala, pukat dan sauk. Dua puluh enam spesies ikan telah direkodkan dari 14 famili didominasi oleh Cyprinidae, diikuti oleh Osphronemidae, Bagridae dan Clariidae. Keluk kelimpahan berpangkat menunjukkan komuniti ikan mempunyai taburan log-normal. Kepelbagaian, kekayaan dan kesamarataan spesies bagi kedua-dua musim penanaman padi adalah sama tetapi kekayaan spesies menunjukkan perbezaan nyata di antara kedua-dua musim. Kepelbagaian spesies adalah tertinggi pada fasa pembiakan (Shannon; 1.83 ± 0.17 and 1.93 ± 0.10), manakala kesamarataan spesies paling tertinggi pada fasa vegetatif (Evenness; 0.70 ± 0.10 and 0.69 ± 0.10). Tetapi, kekayaan spesies adalah paling tinggi pada pada fasa meranum (Margalef; 1.81 ± 0.57 and 2.98 ± 0.21). Indeks kepelbagaian dan kesamarataan spesies adalah tinggi di habitat sungai manakala kekayaan spesies paling tinggi di habitat tali air konkrit dan tali air tanah. Berdasarkan keluk perenggangan, kekayaan spesies mempunyai perbezaan yang nyata ($p < 0.05$) di antara kedua-dua musim di dalam semua fasa dan habitat kecuali sungai bagi fasa vegetatif. Kepelbagaian taksonomi ikan di dalam semua fasa dan habitat tidak mempunyai perbezaan nyata ($p > 0.05$). Namun, analisa dendrogram

dan nMDS menunjukkan bahawa himpunan ikan terbahagikan kepada dua kumpulan (aras keserupaan 69%) dan tiga kumpulan (aras keserupaan 80%). Himpunan ikan juga berbeza di antara semua habitat. ANOSIM menunjukkan dua fasa terawal penanaman padi mempunyai nilai kesamaan setara (nilai statistik R = 0.5) tetapi fasa meranum tidak serupa dengan fasa vegetatif dan pembiakan (nilai statistik R = 1). Himpunan ikan berdasarkan habitat juga tidak serupa di antara satu sama lain (nilai statistik R = 1). Keputusan SIMPER menunjukkan nilai keserupaan antara fasa dan habitat telah disumbangkan oleh spesies yang ditemui dalam jumlah yang banyak sepanjang musim penanaman padi. Hasil dapatan kajian telah menambah maklumat mengenai dinamik ikan di kawasan sawah padi dan sangat penting untuk penggunaan sawah padi bagi menjana ekonomi penduduk setempat melalui kaedah penternakan ikan bersepadu.