

**POPULATION GENETICS AND EVALUATION OF DIALLEL  
CROSS OF FOUR RED TILAPIA POPULATIONS IN MALAYSIA**

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## ABSTRACT

Tilapia is an important farmed freshwater fish in Malaysia. Tilapia farming was introduced in Malaysia in the 1940's. In 2003, tilapia accounted 21,417 tons of total freshwater aquaculture production. Red hybrid is the most popular tilapia species cultured in Malaysia. One of the constraints faced by the industry is quality of fries. There are quite a number of private hatcheries in Malaysia producing tilapia fries and not much is known about their quality with respect to their genetic variability. Thus this study attempted to characterize the four study populations and one standard population, which were PKPS (PS), Bentong (BT), Enggor (EG), Negeri Sembilan (NS) and Gift (GT) as control population using 20 polymorphic Microsatellite markers. Gift population is Nile tilapia. Their dendrogram relationship showed that the heterozygosity value was high, which indicated the presence of high genetic variability among the five populations. As a continuation, Diallel Crossing was started among four populations, which were PKPS (PS), Bentong (BN), Enggor (EG) and Negeri Sembilan (NS). Attention given to two traits, which were Growth and Survival. In Growth Factor, trait studied was Specific Growth Rate. In Survival, Egg Hatchability, Fry Survival and Adult Fish Survival were the three parameters focused on. As a outcome of this study, managed to produce broodstocks with known genetic attributes through quantitative genetics for fast growth rates based on high heritability, high additive variance and low environmental effects.

**Keywords: Tilapia, microsatellite, population genetics, diallel cross and quantitative genetics.**

## ABSTRAK

Tilapia merupakan spesies ikan airtawar yang sangat penting di Malaysia. Berdasarkan pada statistik akuakultur ikan airtawar, Tilapia menduduki tempat pertama dalam senarai pengeluaran untuk beberapa tahun. Pada tahun 2003, tilapia meliputi 21,417 tan dari keseluruhan pengeluaran akuakultur ikan airtawar. Berdasarkan pada pilihan warna, industri akuakultur Malaysia pada kebiasaan memilih kacukan Tilapia merah. Salah satu daripada sekatan yang dihadapi oleh industri adalah penentuan kualiti anak ikan. Oleh yang demikian langkah telah diambil untuk mengkaji baka terbaik dari segi genetik daipada empat induk kajian (*Oreochromis spp*) dan satu induk rujukan (*Oreochromis niloticus*) dari Malaysia. Empat populasi kajian tersebut ialah PKPS (PS), Bentong (BT), Enggor (EG), Negeri Sembilan (NS) dan Gift (GF) sebagai induk rujukan. Penanda microsatellite telah digunakan untuk mengkaji perhubungan antara lima populasi tersebut. Dua puluh pasang primer telah digunakan dalam kajian ini. Hubungan dendogram lima populasi ini menunjukkan peratus heterozygosity yang tinggi. Populasi Bentong menunjukkan perbezaan yang tinggi daripada empat populasi yang lain. Kajian ini diteruskan dengan kacukan diallel. Empat populasi iaitu PKPS, Bentong, Enggor dan Negeri Sembilan telah dikacuk. Keutamaan di beri pada tiga aspek iaitu Pembesaran dan Kadar Hidup. Hasil kajian ini berjaya menghasilkan progeni yang kuat dari segi kualiti genetik dan yang mempunyai tumbesaran yang mampan.

**Katakunci: Tilapia, microsatellite, genetic populasi, kacukan diallel dan pembiakbaik bakaan.**

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## LIST OF SYMBOLS AND ABBREVIATIONS

EDTA	Ethylenediamine tetraacetate
KCl	Potassium chloride
MgCl <sub>2</sub>	Magnesium chloride
NaCl	Sodium chloride
SDS	Sodium dodecyl sulphate
TBE	Tris borate EDTA buffer
Tris	Tris base
Bp	Base pair
<sup>0</sup> C	Degree of celcius
h	hour
kb	kilobase
min	minute
mM	milimolar
ng	nanogram
s	second

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