IMPROVED NILE TILAPIA, KMFRI-SAGANA STRAIN (F-8)

Nile tilapia (Oreochromis niloticus) contributes 80% of the fish farmed in Kenya

Why tilapia?

- Fast growth
- Feeding low in the food chain (opportunistic omnivorous)
- Resistant to poor water quality
- Resistant to diseases
- High genetic diversity in the available natural tilapia germplasm

Problems of Inbreeding in Nile tilapia

- Fast maturity at a small size (<40g)
- Prolific breeding in ponds
- Reduced and stunted growth
- Lower yields
- Poor FCR

Challenges to achieving better growth

- Low temperatures in high-altitude areas
- Poor feeding
- Use of poor-quality feeds
- Poor water quality management
- Predators
- Lack of stock improvement programme

Benefits of selective breeding

- Increased farm production
- Fish with better fillet yield
- Fish with improved growth rates
- Fish resistant to diseases
- Resilience to climate changes

Selective Breeding Protocol

1) Hapa nets for fry Nursery

2) Tagging selected brooders

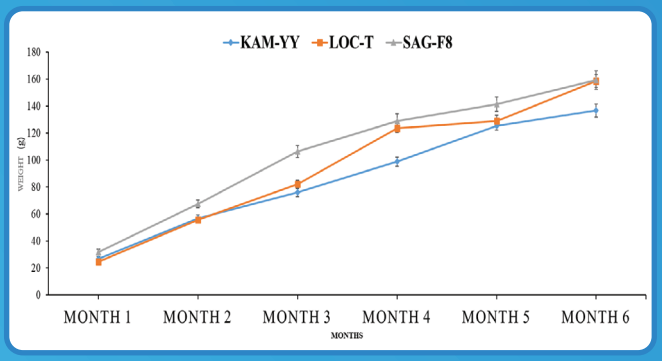
3) Monitoring brooders

4) Table size mature brooders

On-farm growth performance of Sagana F-8 Strain

Fish strains

Parameter	KAM-YY	LOC-T	SAGANA-F8	P-value
Initial weight (g)	4.963±0.031 ^{a}	5.044±0.031 ^{a}	4.985±0.036 ^{a}	0.4
Mean Final length(cm)	19.41 ±0.29 ^{b}	20.31 ±0.20 ^{a}	20.21 ±0.28 ^{ab}	0.24
Mean Final weight (g)	138.253±4.49 ^{b}	158.623±4.67 ^{a}	159.786±6.76 ^{a}	0.002
Mean BWG (g)	131.74±4.75 ^{b}	153.62±4.67 ^{a}	154.39±6.66 ^{a}	0.002
Daily weight gain	0.74±0.025 ^{a}	0.853±0.026 ^{b}	0.86±0.038 ^{b}	0.003
Mean SGR (% day-1)	2.69±0.02 ^{b}	2.77±0.02 ^{a}	2.77±0.02 ^{a}	0.004
Feed conversion ratio	2.58±0.02 ^{b}	2.57±0.02 ^{b}	2.55±0.02 ^{b}	0.18
Average FI (% BW)	12.9 ± 0.4 ^{a}	14.8 ± 0.4 ^{b}	14.9 ± 0.6 ^{b}	0.003
Condition factor (K)	1.97±0.01 ^{b}	1.94±0.01 ^{b}	2.05±0.02 ^{b}	0.001
Survival (%)	85±1.0 ^{a}	87±2.3 ^{a}	83±2.9 ^{a}	0.488



Validation of body composition

		Fish strains			ANOVA test	
Component	Unit	KAM -YY	LOC-T	SAG-F8	F-value	p-value
Energy	MJ/Kg	29.87±1.15 ^{a}	30.97±1.29 ^{a}	32.55±0.55 ^{a}	1.17	0.382
Moisture	%	2.03±0.59 ^{a}	2.03±0.40 ^{a}	5.44±1.82 ^{a}	4.51	0.076
Ash	%	15.87±1.99 ^{a}	12.93±1.72 ^{a}	15.00±0.30 ^{a}	0.81	0.497
Fiber	%	12.50±1.06 ^{a}	13.63±0.44 ^{a}	13.75±0.45 ^{a}	0.79	0.503
Fat	%	19.67±3.14 ^{a}	2.23±4.23 ^{a}	24.60±1.30 ^{a}	0.43	0.674
Protein	%	60.37±0.89 ^{a}	61.23±2.34 ^{a}	65.40±0.20 ^{a}	2.71	0.209
P	%	2.90±0.35 ^{a}	2.37±0.12 ^{a}	2.96±0.11 ^{a}	1.74	0.264
Ca	%	5.25±0.73 ^{a}	4.22±0.29 ^{a}	5.44±0.2 ^{a}	1.55	0.299

Growth Performance in Different ecological zones

	County	Culture System	Table size av. Wt. (g) achieved with stocking weight of 1g after 7 months	Av. Water temperature (°C)
1)	Kirinyaga	Earthen Ponds and Liner	350	27
2)	Nairobi	Tank system	365	22
3)	Kiambu	Liner Ponds	320	18
4)	Meru	Liner Ponds	358	20
5)	Nakuru	Liner Ponds	395	26
6)	Siaya	cages	450	28
7)	Machakos	Liner	403	26
8)	Homa bay	Liner Ponds/Earthen	450	28
9)	Makueni	Liner Ponds	400	28
10)	Vihiga	Liner Ponds/ Earthen	400	30
11)	Kakamega	Earthen Ponds and Liners	410	27

Proposed genetic improvement and breeding model for O. niloticus in Kenya

Breeding Nucleus → **Hatchery** → **Nurseries** → **Farmer**

(Broodstock) *(Spawn or fry)* *(Fingerling)*

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