A PILOT EVALUATION OF AQUACULTURE INTEGRATION WITH IRRIGATED FARMING SYSTEMS

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With a global emphasis on ecologically sustainable development of natural resources, it is logical to integrate, where possible, appropriate farming practices to enhance productivity. The production of silver perch *Bidyanus bidyanus* under semi-intensive culture conditions was evaluated as part of an integrated agriculture/aquaculture research project in the Goulburn-Murray Irrigation District (GMID) of Victoria. The study aimed to demonstrate the integration of aquaculture into existing irrigated farming systems during a normal irrigation season and to adapt and develop appropriate husbandry and production methodologies to enable viable, cost-effective commercial fish production in such systems.

Silver perch were grown in 3 experimental integrated systems, viz: channel ranch cages (floating cages in an irrigation supply channel), storage cages (floating cages in an on-farm storage) and groundwater tanks (floating cages in above-ground, PVC lined tanks). Cages were $1.0m^3$ volume and were constructed of polyurethane mesh ($144mm^2$). A fourth system, an "industry standard", consisted of purpose-built, earthen fish ponds at a local commercial fish farm. All cages were stocked with hatchery-bred, "advanced young-of-the-year" silver perch (mean weight 18.3 ± 1.4g; mean length 110.1 ± 2.5mm) in November (channel, groundwater and fish farm sites) and December (storage site; mean weight 9.7 ± 0.2g; mean length 9 1.6 ± 1.6mm), and were harvested in April 1995. Fish were hand-fed once daily with commercially available feed. Primary experimental fish husbandry variables for each experimental culture system included high and low stocking (60 and 40 fish/cage respectively) and high and low feeding rates (6 and 4% bodyweight/day respectively), each replicated 3 times and tested concurrently in all combinations. Random subsamples were collected at the commencement of the experiments and at monthly intervals to determine growth. All live fish were counted at the completion of the trials to estimate survival.

Table 1. Final weight, survival and daily growth of silver perch by site

Site	Mean final weight (g)	± SE	% Survival	± SE	Mean daily growth (g/day)	± SE
Groundwater	54.3	4.1	45.5	8.5	0.21	0.14
Channel	72.7	4.9	92.6	4.0	0.32	0.17
Storage	42.5	1.9	97.0	6.5	0.29	0.09
Fish Farm	81.7	2.8	68.5	17.5	0.38	0.10

No significant differences in growth rate were found either between treatments within each site or between treatments between sites. Both growth rate in weight and final fish size were significantly greater in the farm ponds and channel site than in the groundwater and storage sites. Thus any differences were due to site effect only. Although the final mean size of fish in the trials was less than 90g, which is inadequate for commercial purposes, fish in at least the channel site grew at effectively the same rate as that of fish in the farm ponds. The maximum final weight of some fish from the channel and farm pond sites was greater than 200g, suggesting that greater overall production of silver perch is possible in at least these systems. The fish in the groundwater system exhibited the slowest growth, due primarily to water quality problems in the tanks.

During the trials, optimal temperature conditions (20-25°C) existed for no more than about half (three months) of the total test period. However in the latter part of the season, when water temperatures began to decline, growth rates were maintained in all systems. This suggests that other parameters such as feed type and water quality are also equally important determinants to growth, and that under more optimal conditions, growth rates may be significantly enhanced and viable integrated production of silver perch achieved in the GMID.

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