

Quality Seed and Broodstock in Aquaculture: A Farmer's Guide to Separating Facts from Lies

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SUMMARY

Quality seed and broodstock determine the success of aquaculture operations. Farmers often struggle to distinguish genuine quality from false claims. This article provides practical tools for evaluating finfish and shellfish seed and broodstock. It covers visual inspection checklists, simple stress tests, genetic principles explained in accessible language, and certification systems that protect farmers from fraud. Application of these methods ensures farmers begin production cycles with healthy, high-performing stock.

INTRODUCTION

In aquaculture, success is determined before the first feed is given. The quality of seed (fry, fingerlings, post-larvae) and broodstock (mature breeding animals) sets the ceiling for growth, survival, disease resistance, and profitability. Seed selection accounts for approximately 70% of farm success.

Dishonest sellers exploit farmer's lack of knowledge. They display only the best fish from tank surfaces, conceal weak individuals, and make unsubstantiated genetic claims. This article equips farmers with practical tools to evaluate stock and make informed purchasing decisions.

Defining Quality in Aquaculture Seed

Quality seed possesses five universal characteristics:

Genetic potential - Inherent capacity for rapid growth, efficient feed conversion, and disease resistance

Health status - Freedom from pathogens, parasites, and physical deformities

Physiological robustness - Ability to withstand handling, transport, and environmental fluctuations

Nutritional adequacy - Evidence of active feeding and adequate energy reserves

Size uniformity - Consistent size within batches prevents cannibalism and social suppression

Finfish Broodstock Selection

Selection of broodstock should focus on genetic quality, physical health, and optimum age or size, as these factors determine the growth potential, feed efficiency, and disease resistance of the offspring. Broodfish should preferably be obtained from certified hatcheries or genetically improved strains such as Jayanti Rohu and Amrit Catla, or from natural water bodies to maintain genetic diversity, provided they are healthy and disease-free.

During selection, only fish with normal body shape, intact fins, bright scales, and active swimming behaviour should be chosen. Mature males usually have a slender body with rough pectoral fins, while females show a soft, bulging abdomen, indicating gonadal maturity.

Broodfish must also fall within the optimal reproductive age or size. For Indian major carps such as Rohu, Catla, and Mrigal, broodstock between 2-5 years of age generally show the best breeding performance.

To maintain stock quality, mass selection is commonly practiced, where approximately 20% of the best-performing individuals (based on growth and body weight) are retained as broodstock and precautions must be taken to avoid inbreeding by periodically introducing broodstock from different sources.

Shrimp Broodstock Selection

Broodstock should always be obtained from approved and certified sources, preferably Specific Pathogen Free (SPF) stocks, to ensure free from major pathogens. In India, the import and use of SPF broodstock are regulated by the Coastal Aquaculture Authority, which ensure that broodstock undergo quarantine and pathogen screening before distribution to hatcheries. Selected shrimp should exhibit normal body colour, intact appendages, active swimming behaviour, and absence of lesions, fouling organisms, or deformities, indicating good health and suitability for breeding.

Selecting the correct sex ratio (1 male: 2-3 females) is critical for breeding success. Females are larger (35 - 45 g for *P. vannamei*, up to 80 g for *P. monodon*) with a broader abdomen and develop visible ovaries that appear as dark, branched lobes extending through the cephalothorax and first three abdominal segments as they mature. The female reproductive organ (thelycum) is located between the fourth and fifth pairs of walking legs - *P. vannamei* has an "open thelycum" where mating occurs after female moulting. Males are smaller (30 - 40 g) with the petasma (male reproductive organ) visible at the base of the first pair of pleopods, and spermatophores (white sperm packets) located near the fifth pair of walking legs. Males mature

earlier (6-8 months) than females (8-16 months) and can be identified by the presence of sperm masses without needing to dissect the animal.

Identification of Good Quality Fish Seed

Physical Characteristics

A simple visual inspection can reveal a lot. Compare your seed against these criteria:

Feature	Good Quality Seed	Poor Quality Seed
Body Shape	Well-proportioned, full body	Thin, lean body with a large head
Colour	Bright, uniform, and shiny	Pale, faded, or patchy colour
Skin & Scales	Smooth, slimy texture; all scales intact	Rough texture; missing scales or spots
Appendages	Fins are intact, not frayed	Fins are damaged or split
Deformities	None	Crooked spine, twisted mouth

Behavioural Indicators

Healthy seed is active and responsive. Perform these simple checks:

Swimming: They should swim actively and vigorously against a gentle water current. Weak fish will be carried to the centre.

Reaction to Touch: A healthy fish will immediately dart away when you touch it or stir the water. Lethargic fish that don't react are unhealthy.

Position in Water: Observe where they swim. For carp, Catla usually swim near the surface, Rohu in the middle, and Mrigal near the bottom. Deviation can indicate stress or mixing of species.

Uniformity: The entire batch should be of similar size and colour. Avoid batches with many runts.

Source and Genetic Quality

Reputable Hatchery: Always buy from a known hatchery with good management practices. Avoid wild-caught seed if possible.

Broodstock: Ask if they use healthy, unrelated brooders from a recognized source. This avoids inbreeding, which causes deformities and poor growth.

Health History: Inquire about disease outbreaks or mortality in the nursery.

Shrimp Seed Quality: Criteria for Post-Larvae Selection

Quality shrimp seed (post-larvae) is the primary biological determinant of farming success, influencing survival, growth performance, and disease resistance throughout the culture cycle. Farmers must procure seed exclusively from Coastal Aquaculture Authority (CAA) - registered hatcheries with documented disease-free history and valid certification. The selected seed batch must exhibit morphological uniformity (coefficient of variation <10% in body length), positive phototactic response, and absence of deformities such as bent rostrum, setal damage, or necrotic appendages. Stocking PL15 stage (15 days post-metamorphosis) is recommended as they possess fully developed physiological systems (functional gills, complete setation) and greater resilience to osmotic and handling stress compared to younger stages. Critical health certification includes PCR-negative status for notifiable pathogens, particularly White Spot Syndrome Virus (WSSV), as vertical transmission from broodstock remains a significant risk pathway.

Quantitative field tests provide objective assessment of seed quality:

Test	Protocol	Acceptance Criteria
Salinity stress test	Transfer 100 PL from hatchery water (28-30 ppt) to 15-20 ppt; observe for 30-60 minutes	>90% survival with active swimming; minimal lethargy
Formalin stress test	Expose PL to 50-100 ppm formalin solution for 30-60 minutes	Active swimming without mortality; tolerance indicates robust health
Muscle-gut ratio	Observe under microscope; measure muscle width relative to gut width at 6th abdominal segment	Ratio >4:1 indicates good nutritional condition; ratio <3:1 indicates starvation or poor health
Microbiological screening	TCBS agar culture for <i>Vibrio spp.</i>	Green colonies: 0 CFU; Yellow colonies: <50 CFU

Prior to stocking, gradual acclimatization (temperature adjustment $\leq 2^{\circ}\text{C}/\text{hour}$; salinity adjustment ≤ 2 ppt/hour) during cooler periods (late evening or early morning) minimizes thermal shock and osmotic stress, optimizing post-stocking survival.

Seed Certification in Indian Aquaculture

Seed certification in India is a formal quality assurance system ensuring that fish and shellfish seeds (eggs, larvae, fingerlings) are genetically robust, disease-free, and produced under sustainable practices. It is governed by a multi-layered framework of central and state regulations.

Regulatory Framework

Central Authorities: The State Department of Fisheries acts as the competent authority for certification. For marine species, the Coastal Aquaculture Authority (CAA) mandates registration for all shrimp hatcheries under the CAA Act, 2005.

Key Guidelines: The Indigenous Shrimp Guidelines, 2025 require hatcheries producing native shrimp (e.g., *P. monodon*) to have strict biosecurity and quarantine protocols.

State Laws: States like Kerala have their own acts (e.g., Kerala Fish Seed Act, 2014) to register hatcheries, certify seed, and monitor seed transport and quality.

Key Certification Schemes

SHAPHARI (Shrimp): Launched by MPEDA in 2025, this market-driven scheme certifies hatcheries producing antibiotic-free shrimp seeds following Good Aquaculture Practices (GAP). It enhances export credibility and uses the Aqua Trace portal for digital traceability.

CAA Registration: Mandatory for all shrimp hatcheries, involving a physical inspection and a ₹10,000 fee.

BIS Standards: The Bureau of Indian Standards (BIS) has published numerous GAP standards for hatcheries, covering seed transport (IS 10449:2024), shrimp, carp, and marine finfish culture, as well as traceability protocols.

CONCLUSION

The success of aquaculture farming largely depends on the quality of seed and broodstock selected at the beginning of the production cycle. Farmers who carefully evaluate stock using simple visual checks, behavioural observations, and basic stress tests can significantly reduce the risk of poor growth, disease outbreaks, and economic losses. Selecting healthy broodstock, purchasing seed from certified hatcheries, and following recommended certification systems ensure genetic quality, disease-free production, and better farm performance. By applying these practical guidelines, farmers can make informed decisions, avoid misleading claims in the market, and achieve more productive and sustainable aquaculture operations.

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