Descriptors for Registration of Fish Germplasm.

1. Both Marker data, morpho – meristic characters data will be used as descriptors together or individually.

2. The distinct genetic stock will be considered for registration if there is sufficient evidence that allele/haplotype frequencies significantly differ from another neighboring subpopulation atleast at one locus.

3. The genetic stock thus considered distinct must be submitted with standard morpho-meristic data and production traits also, if claimed for the production value.

4. The genetic stocks differences based on only morpho-meristic characteristics will also be considered, if data is supported with sufficient sample size (>50) per location and done through use of standard methodologies & parameters.

5. The appropriate Performa, to derive information from applicant for registration of genetic stock (given above) will be used for production traits, if some genetic stock is claimed for superior production value wrt trait.

5. The desired information will include sample size (>50) per location; only co-dominant & mtDNA markers will be allowed; no. of markers (loci) used; Results to prove that pairs of loci did not suffer from linkage disequilibrium and are neutral; results to prove that the allele frequencies at locus that differ from the nearest neighbors examined with same set or parameters and other details of analysis.

Descriptors of _____Genus _____ Species _____and/or Genetic Stocks

ACCESSION CODE. _____To Be Given at NBFGR_____

A. SPECIES :

B. GENETIC STOCKS

FORM I

PASSPORT INFORMATION OF THE SPECIES TO BE SUBMITTED FOR ACCESSION AT NBFGR, LUCKNOW.

Descriptors of _____Genus _____ Species _____and/or Genetic Stocks

I. GENERAL DESCRIPTORS

1. **Name of the Finfish Species (Scientific Name)**
2. **Name of the Variant/ Genetic Stocks**
3. **Local Name & Language**
4. **Background of the local name**
5. **Close related common species/variant**
6. **Max. Size Reported**
7. **Common Habitat**
8. **Native Distribution**
9. **River basin/ Major River**
10. **Reservoir/ Any other water body**
11. **Local region of High Abundance (if any)**
12. **Collection site (Name & Lat. - Long., Altitude)**
13. **Nearest Railway Station**
14. **Specific Gear Used**
15. **Known Economic Importance**
16. **Local Importance**

17. **Any specific use such as Medicinal / Local Dish & Recipe/Special Occasions/Tribal**
18. **Traditional knowledge (Give Details): Ref. In Local/Community/tribal mythology**:
19. **Restrictions/Protection/ Conservation / under any local Regional/ Community/ Religious sentiments.**

II. DIAGNOSTIC TAXONOMIC CHARACTER (DESCRIPTORS)

Morphological and Meristic Characters

Morphometric characters and measurements of _____ for species description for registration of species/Genetic Stocks

---

	Total length (mm.)
	Total body weight (g)
	Standard length (mm.)
	Head Length (mm.)
	Lateral transverse rows
	Lateral line scale
	Pre-dorsal scale
	Insertion of 1st dorsal fin
	Barbels
	In relation to % of standard length (SL)
	Head Length
	Pre-dorsal length
	Snout to pelvic base
	Snout to anal origin
	Length of caudal peduncle
	Adipose to caudal fin
	Depth of caudal fin
	Dorsal to adipose
	Anal fin base
	Length of dorsal fin
	Dorsal spine length
	Length of pectoral fin
	Length of caudal fin
	In relation to % of head length (HL) 4

Coloration

Other Information

Ref. Taxonomic Key

Source/ Reference

Collected by

Genetic Stock Identification

Form II A

Finfish

A. Morphometric Descriptors of Species

S. No		A	B	C	D
I	Species name and Specimen code no				
II	Sample Field ID				
III	Morphometeric Characters				
1	Total length (TL)				
2	Total body weight (g)				
3	Standard length (SL)				
4	Fork length (FL)				
5	Head length (HL)				
6	Head width (HW)				
7	Snout length				
8	Inter orbital length				
9	Barbles No.				
	(i) Mandibular				
	(ii) Maxillary				
	(iii) Nasal				

	(iv) Rostral				
10	**Eye diameter (ED)**				
11	**Body depth (BD)**				
12	**Mouth width**				
13	**Body Colour**				
14	**Mouth position**				
	(i) Terminal				
	(ii) Sub terminal				
	(ii) Inferior				
15	**Lips**				
	(i) Thick				
	(ii) Thin				
16	**Lateral line scale**				
17	**Dorsal fin length**				
18	**Pectoral fin length**				
19	**Pelvic fin length**				
20	**Anal fin length**				
21	**Caudal fin length**				
22	**Length of origin of dorsal fin to caudal base**				
23	**Pre dorsal length**				
24	**Pre pectoral length**				
25	**Pre pelvic length**				
26	**Pre anal length**				

27	**Body shape** **Elong / comp(E/C)**				

B. Meristic parameters

1	**Dorsal Fin**				
	(i) Spine				
	(ii) Rays				
2	**Pectoral Fin**				
	(i) Spine				
	(ii) Rays				
3	**Pelvic Fin**				
	(i) Spine				
	(ii) Rays				
4	**Anal Fin**				
	(i) Spine				
	(ii) Rays				
5	**Caudal Fin**				
	(i) Spine				
	(ii) Rays				
6	**Gill rakers**				

Form II B

Shrimps

A. Morphological descriptors of species:

	Attribute	A	B	C	D
	Species name and Specimen code no				
	Sample Field ID				
1.	Shape of the body and colouration				
2.	Carapace/Cephalothorax- shape and structures				
3.	Abdominal segments or somites (number and shape)				
4	Tail fan (telson + uropod) structure				
5	Mouth parts				
6	Number, type and structure of appendages and sexual dimorphism				
7	Rostrum shape, structure, rostral teeth				
8	Appendix masculine in male shrimps on the endopods of the first pair of pleopods- its structure				
9	Structure of thelycum in females				
10	Appendix interna				
11	Petasma- types				
12	Dactyl of the third maxilliped- its length compared to the length of the propodus				
13	Larval stages- types (Nauplius/ Protozea/ Mysis/ Zoea/ Ahina/ Phyllosoma/ Puerulus/				

	Megalopa) and number per stage				
14	**"Berried" condition (femal carrying eggs) or spawni females**				
15	**Structure of spermatophore in shrimps with open and closed thelycum**				

Form II C

Molluscan Descriptors

Sl. No.	Descriptor	Details
1.	Shell	Present/Absent
2.	Shell	Outside/inside the body
3.	No. of Shell pieces	One/two valves/8broad plates
4.	Shape of the shell	Flat/cup-shaped/coiled/coiled with complex septa and sutures/conical
5.	If coiled, dextral/sinistral	
6.	Colour of Shell	
7.	Texture of the shell	
8.	Shape of the Umbo of shell	
9.	Shape of the hinge ligament of shell	
10.	Hinge teeth number	
11.	Inner surface of the shell in bivalves	Coarse/smooth/pearl-like (lustrous)/dull
12.	Operculum	Present/absent
13.	Movement	Free-swimming/sedentary/slow-moving/attached
14.	Body Symmetry	Bilaterally symmetrical/asymmetrical
15.	Body	Had undergone torsion/detorsion & coiling
16.	Position of mouth and arms	
17.	Byssus threads	Present/Absent
18.	Nature of mantle	
19.	Foot	Present/Absent
20.	Position of Foot	
21.	Shape and size of foot	
22.	Whether foot is	Muscular/Flat (creeping sole)
23.	Distinct Head region	Present/Absent
24.	Eyes	Present/Absent
25.	Position of the eyes	Base of the tentacle/Tip of the tentacle
26.	Tentacles (small as in gastropods)	Present/Absent
27.	Arms & tentacles (modified foot)	Present/Absent
28.	Number of tentacles	
29.	Suckers in tentacles	Present/Absent
30.	Shape & size of Arms & tentacles	
31.	Ctenidium/Gills	Present/Absent
32.	Gills	Monopectinate/Bipectinate
33.	Secondary gills	Present/Absent

34.	Secondary gills	Pallial gills/pulmonary sac/Nuchal lobes/Pseudepipodia
35.	Osphradium	Present/Absent
36.	Scraping radula (lingual ribbon)	Present/Absent
37.	Number of teeth in each transverse row on radula	Seven/three/two
38.	Proboscis	Absent/Present & well developed
39.	Adductor muscles	Present/Absent
40.	Position of attachment of adductor muscles on the shell	
41.	Ganglions/aggregation of neurons	Developed/not developed
42.	Poison gland	Present/Absent
43.	Reproductive System	Dioecious (sexes separate)/ hermaphrodite
44.	Sexual dimorphism	Present/Absent
45.	Copulatory organs	Present/Absent
46.	Hectocotylus arm	Present/Absent
47.	Ink sac	Present/Absent
48.	Siphon	Present/Absent
49.	Lateral fins (parapodium)	Present/Absent
50.	Fertilization	External/internal
51.	Eggs	Calcareous/gelatinous & soft/microscopic/elongated/large
52.	Larval stages	Trochophoe/Veliger/Pediveliger/Platigrade/D-shaped/Glochidium
53.	Larval movement	Free-swimming/planktonic
54.	Larval cycle	Free-living/Parasitic
55.	Habitat	Marine/brackish water/freshwater/terrestrial/ amphibious

Form III A

III. Molecular Descriptors for the Genetic Stocks identified in - _____

Type of Marker Nuclear / Mitochondrial

1. General Information

1.1 Sample collection details and sample size analysed

Sampling Location and Sample Size	**Region**			
	Rivers			
	Locality			
	(Lat. & Long.)			
	Sample Size			
	Total Sample Size			

1.2 Overview of the types of Molecular markers used in analysis

	Allozyme	**Microsatellite**
Total Sample Size		
Total Loci Examined		
Polymorphic Loci		
Significant Loci Over all the Three Populations. (P < ---)		
Coefficient of Genetic Differentiation(Fst) Over all the Three Populations. (P <------)		
Linkage disequilibrium between any pair of loci in each population sample or over all the populations		

2. Molecular Descriptors:

2.1. Allele Frequencies of Thirteen Polymorphic Allozyme Loci, Private Alleles and Parameter of Genetic Variation.

1. Allele Frequencies					
	Locus	**Alleles**	**Locatons**		
i.	***AAT-2****				
ii.	***EST-1****				
iii.	***EST-2****				
iv.	***EST-3****				
v.	***G_3PDH****				
vi.	***G_6PDH****				
vii	***GLDH****				
viii.	***GPI-2****				
ix.	***LDH-2****				
x.	***MDH****				
xi.	***ODH-2****				
	PGM*				
xii.	***SOD****				
xiii.	***XDH-1****				
2. Private Alleles (Population Specific Alleles)					
3. Parameters of Genetic Variation					
i.	**H obs**				
ii.	**H exp**				
iii.	**$P_{(0.95)}$**				

iv.	**$P_{(0.99)}$**				
v.	**A_n**				

2.2. Allele Frequencies of Eight Polymorphic Microsatellite Loci, Private Alleles and Parameter of Genetic Variation.

1. Allele Frequencies					
	Locus	**Allele size (bp)**	**Meenachil**	**Chalakkudy**	**Nethravathi**
i.					
ii.					
iii.					
iv.					

v.					
vi.					
vii					
viii.					

2. Private Alleles (Population Specific Alleles)					
3. Parameters of Genetic Variation					
i.	**H obs**				
ii.	**H exp**				
iii.	**Fis**				
iv.	**$P_{(0.95)}$**				
v	**$P_{(0.99)}$**				
vi	**A_n**				

Abbreviations used in the table:

H obs = Observed heterozygosity

H exp = Expected heterozygosity
Fis = Inbreeding coefficient
P_{HW} = Probability value of significant deviation from HWE
Pscore = Probability value of significant heterozygosity deficiency
$P_{(0.95)}$ = Polymorphism at 0.95 criteria
$P_{(0.99)}$ = Polymorphism at 0.99 criteria
A_n = Mean number of alleles per locus

2.3. Parameters of Genetic Divergence; Allelic Heterogeneity at Allozyme and Microsatellite Loci and Coefficient of Genetic Differentiation (Fst) between Three Population Pairs

S. No.	Population Pair	Loci Exhibiting Significant Allelic Heterogeneity (P=)	Fst (P=)
Microsatellite loci			
1			
2			
3			
Allozyme Loci			
1			
2			
3			

Mitochondrial DNA Markers

	Mt DNA Regions analysed	
Total Sample Size		
Total Sequence Length Amplified Examined (bp)		
Aligned Sequence Length Examined (bp)		
A,T,G,C (%)		
Polymorphic Sites		
No. of haplotypes		
Haplotype Diversity Index		
Population Specific Haplotypes		

Form IV A

Production Traits: Finfish

From Aquaculture Farm Based Population

1. **To be used for registration**
   a. **if the source of study material belongs to aquaculture**
   b. **Atleast 2 or more groups are comapared that give distinct difference when registration is claimed based on exclusive production value.**
   c. **Data for only one group can be used as production descriptor if combined data from molecular markers or other morphological parameters.**

2. **To be based on random sample of atleast 100 individuals of each batch from which material is considered for registration**

Stage **Fry/ Fingerling/ Grow out/ Brood fish**

	Parent Broodstock Source	
	Present Size **Weight (gm)** **Length (mm)**	
	Period of **During which present size is attained (days)**	
	Size stocked at the time of initial observation	

Length Weight Relationship, Condition factor, Size at First maturity, Gonado-Somatic Index, Fecudity as per given for Wild Populations.

Form IV B

Production Traits: Shrimp

1. To be used for registration

- **d. if the source of study material belongs to aquaculture**
- **e. Atleast 2 or more groups are comapared that give distinct difference when registration is claimed based on exclusive production value.**
- **f. Data for only one group can be used as production descriptor if combined data from molecular markers or other morphological parameters.**

2. To be based on random sample of atleast 100 individuals of each batch from which material is considered for registration

Stage Nauplii/ Zoea/ Grow out/ Broddstock

1.	**Parent Broodstock Source**	
2.	**Present Size (range)** **Weight (gm)** **Length (mm)**	
3.	**Period of** **During which present size is attained (days)**	
4.	**Size stocked at the time of initial observation (range)**	

Form IV.

From Wild Populations in native Distribution Range/ Aquaculture or Domesticated Populations

A. Age and Growth Parameter

1. **Measurement of the scales and age profiling by back calculation (table.1)**
2. **Specific rate of linear growth**
3. **Specific rate of weight increase**
4. **Index of population weight growth intensity**
5. **Index of species average size**
6. **Growth characteristic and growth constant**
7. **Growth compensation or Lee's phenomenon**
8. **Length frequency distribution**
9. **Relationship between net somatic weight, fork length, total length, standard length, body depth etc.**

B. Morphometric parameters *(27 as per table 2),* **meristic parameters** *(as per table 3),* **including larval morphmetrics**

C. Length weight relationship, condition factor

D. Reproductive parameters

1. **Maturity stages**
2. **Size at first maturity (as per table No. 4)**
3. **Gonado somatic index (as per table No.5)**
4. **Fecundity (as per table 6), Egg diameter**
5. **Sex ratio**

Table 1. Measurement of the scales and age profiling by back calculation

Species name and code No:								**Sex:**			**TL (mm):**			**TW:**		
Scale No.	**S (mm)**	**Ring no: 1**			**Ring no: 2**			**Ring no: 3**			**Ring no: 4**			**Ring no: 5**		
		Age (yrs)	**S_n (mm)**	**L_n (mm)**	**Age (yrs)**	**S_n (mm)**	**L_n (mm)**	**Age (yrs)**	**S_n (mm)**	**L_n _(mm)**	**Age (yrs)**	**S_n (mm)**	**L_n (mm)**	**Age (yrs)**	**S_n (mm)**	**L_n (mm)**
1																
2																
3																
4																
5																
Comments:																
Species and code No:								**Sex:**			**TL (mm):**			**TW:**		
Scale No	**S (mm)**	**Ring no: 1**			**Ring no: 2**			**Ring no: 3**			**Ring no: 4**			**Ring no: 5**		
		Age (yrs)	**S_n (mm)**	**L_n (mm)**	**Age (yrs)**	**S_n (mm)**	**L_n (mm)**	**Age (yrs)**	**S_n (mm)**	**L_n _(mm)**	**Age (yrs)**	**S_n (mm)**	**L_n (mm)**	**Age (yrs)**	**S_n (mm)**	**L_n (mm)**
1																
2																
3																
4																
5																
Comments:																

Table 2. Size at first maturity

Species name and code No:……..

Male			*Female*		
Size group (mid – point) mm	**No. of observation TL (mm)**	**% of mature fish**	**Size group**	**No. of observation TL (mm)**	**% of mature fish**

Table 3. Gonadosomatic index

Species and code No						
Sl.No	**Fish weight FW (g)**	**Sex**	**Gonad weight GW*(g)**	**Stage of maturity**	**Fish weight - gonad weight (FW-GW)**	**GSI GW*100/(FW-GW)**
1.						
2.						
3.						
4.						
5.						
6						
7						
8						
9						
10						
11						
12						

ature fish: As per reproductive stage classification; Stage 3 and above.

Males: The testes appear prominent. The white milt flows on small incision.

Females: Ovaries appear filled. The color mostly Creamish red but can vary from species to species. On small incision Eggs visible with unaided eyes.

Table 4. Fecundity

Name of the species and code No……

No. of sub sample	Sample length (cm)	Sub sample wt.(g)- sw_i	Gonad wt.(g)- GW	No. of mature eggs- n_i	Fecundity (n_i*GW/sw_i) f_i	Average fecundity ($f_1+f_2+f_3$) /3	Fecundity per 100g body wt
1							
2							
3							

Annexure I.

Good Photograph of Fish / Shell fish and or its sieges of development.