

- **FISHING GEAR
ACCESSORIES/
APPURTENANCES**

CHOICE OF NETTING MATERIALS FOR FISHING GEAR :

- Knowledge on properties of netting materials & the essential requirements of fishing gears & methods is necessary for selection of fishing gear.
- **Selection depends on following factors :**
 - i. Type & size of fishing gear
 - ii. Species of fish to be caught
 - iii. Condition of fishing & ground of fishing
 - iv. Type , size & engine power of vessel
 - v. Types of operation
 - vi. Local availability

vii) Traditions of fishermen

Viii) Price of netting material

- One netting material cannot meet all requirements.
- **Purchase specification :**
- While purchasing netting yarn & netting following details are to be specified :
 - Kind & type of fibre
 - Numbering of yarn/size (tex system)
 - Twisted/braided netting yarn
 - Degree of twist/tightness of braid
 - Wt or quantity of material required

- With/without core in braided yarn
- Knotted/knotless netting
- Size of mesh
- Size of netting- meshes in T & N direction
- Direction of stretching
- Selvedge if required
- Dyeing/any other treatment
- **Choice of netting for bottom trawls :**
- Following requirements are to be considered.
- **(i) High breaking strength** : Netting material for bottom trawl should have high wet knot strength, high extensibility, small diameter and high abrasion resistance.

- For trawl nets lower towing resistance allows either a reduction of towing power with consequent saving in fuel, or increased towing speed or the use of a larger net by which the catching efficiency may be increased.
- PA continuous filament netting yarns have max wet knot breaking strength followed by PP, PE & PES.
- (ii) High extensibility :
- High elongation combined with high elasticity and high wet knot strength result in a high toughness which enables the net to withstand rough treatment

- during fishing and to safely haul in large catch.
- Toughness of netting increases with high elongation, high elasticity & high wet knot breaking strength.
- It is imp in bottom trawl to enable it to withstand rough treatment during fishing & to haul large catches.
- PA staple fibres have highest elongation, then PA cont filament, PE monofilament & PES.
- (iii) Small diameter :
- Wet knot strength and fiber density determine the diameter of the netting yarns.
- High density & high breaking strength favors thin netting yarns.

- PES cont filament have smallest dia, the PA cont . filament for same knot breaking strength.
- (iv) High abrasion resistance :
- Bottom trawls subject to more wear & tear during operation & haulage,.
- So, material chosen should have high abrasion resistance.
- PA monofilament is superior than others.
- (v) Size of netting yarn
- The different part of a trawl is naturally subjected to different stress during fishing and has different mesh size.

- A perfect adjustment of netting yarn size would result in the lightest net possible.
- PP should be used in the form of split fibers or folded monofilaments.
- Presently, PA cont filament & PE monofilaments are commonly used in bottom trawls.
- PE monofilament – 20% heavier than PA C.F for same knot breaking strength & thicker than PA.
- PA cont fil – less bulky & lighter in wt. easy to handle & storage. Preferred in bottom trawls.
- PE monofilament – much cheaper, do not change length in water, low sp gravity, reduced chance of damage on rough ground. Commonly used in trawls

- **Choice of netting materials for mid-water trawls :**
- Mid-water trawl used for bulk catching of pelagics.
- Certain requirements are same as bottom trawl.
- Some differences arising out of behavior of pelagic fishes & fishing condition in column areas.
- Frightening effect of approaching gear is reduced by increasing size of net. Improves fishing efficiency by reducing water stow & disturbances.
- Requirements :
 - (i) Large mesh size
 - (ii) Very high breaking strength
 - (iii) Smallest possible diameter

- PA cont filament is best for mid-water trawl.
- **Choice of netting materials for purse seine :**
- Most imp requirement is its high sinking speed.
- Materials should have high breaking strength, low resistance to water flow & reasonable price.
- Materials increase sinking speed are high density of fibre, smooth surface & small dia.
- PE & PP – high breaking strength, but low sp. gravity
- PVD – highest sp. gravity but lowest breaking strength & not suitable for purse seine.
- PES – high sp. gravity accelerate sinking speed.

- PA cont filament – low sp. gravity but higher breaking strength.
- Considering the whole, the most suitable materials for purse seine are probably netting yarns made of PA continuous filament and of PES continuous filaments
- **Choice of netting materials for gill net :**
- Gill netting – passive fishing method.
- Requirements are : (i) Low visibility in water
- (ii) Fineness & softness of netting yarn
- (iii) Extensibility & elasticity sufficient to hold the gilled fish.

- (iv) Good knot stability, so that mesh does not change with gilling & after removal of fish.
- Day time gill netting – PA monofilaments are preferred for low visibility & softness.
- For larger & heavier fishes – PA cont filament.
- Netting yarn made of the very strong PA continuous filaments should have soft twist.
- Hard and even medium twisted PA netting yarns are not recommended because of their high elongation at low loads which is undesirable for the function of gill netting.

- **Conclusion**

- At present there is a concern regarding biodiversity conservation and fish species sustainability.
- Practically optimization of these two things is rather difficult but maximum extent to which it is possible that can be done.
- For this purpose mesh size regulation, selectivity of the fishing gears, selection of suitable netting material for major commercial fishing gears are most important considerations.

Care and maintenance of fishing gear

- All fishing gear whether made of natural or synthetic materials need proper treatment, preservation and storage for longer life expectancy and better catching efficiency. There are several causes affecting the efficiency and durability of the materials. These are :

- i. Rotting
- ii. Weathering
- iii. Abrasion
- iv. Mechanical destruction by animals
- v. Fouling
- vi. Rusting

Besides, the materials have to be treated with preservatives to increase their stiffness, avoid knot slippage and colouring for improving the catching efficiency. The methods of material preservation can be grouped in to three based on their functions:

- i. Sterilization – Putrefactive bacteria are killed either by sunlight or treatment with copper salts
- ii. Protection- Coating of either tannin or coal products on the twines
- iii. Combination of both

Preservation against rotting:

Washing and sunlight disinfection : In this method the nets are washed in fresh water and dried in sunlight. This is simplest preservative methods. However, in certain gears like set nets, trap nets etc. which remain in water for a long time, it becomes difficult.

Tanning:

- Tanning which is extracted from barks, roots, leaves, seed coats, fruits, etc. is poisonous to micro-organisms. In tanning a thin coat of tannin is given to the netting. Tannin can be prepared by two methods, viz. hot process and cold process. The readymade tannin extract available in the market is called catch.

Preparation of dyeing bath

- Hot process : The bark is cut in to small pieces, crushed and then added to the water in the ratio of 1 kg: 10-15 liters of water. Sufficient water, 4-5 times the weight of nets, is taken. The water is then boiled for about 2-3 hours till the colour of the bath becomes brown. The bark is removed and the solution is ready for use.
- Cold process : Water with the crushed bark is kept for 2-3 days instead of boiling as in the case of hot process, it can be kept in sunlight for some time. The bath is decanted and is ready for treatment.

- Dyeing bath using cutch : The cutch is powdered in a gunny bag and it is suspended in water and boiled until the cutch gets dissolved completely. For effective treatment, in every 100 liters of water 4-5kg of cutch is required.

Treatment of net with dyeing bath

- This method of treatment is commonly used by fishermen as it is cheap and the material is easily available. The net is dipped in the dyeing bath overnight. Then the net is drained to get rid of excess solution. After draining the net is dried in shade.
- Dipping, draining and drying is repeated four times to get the best results. If the dying bath is prepared by cold process, the net is dried in sunlight before dipping.

- This method of treatment is cheap, the main disadvantage is that the process has to be repeated frequently since the tannin dissolves in water.
- Tannin fixation : Tannin is fixed by oxidation using copper sulphate, sodium or potassium dichromate. Fixation by copper sulphate is a Dutch method while that of potassium dichromate is of Japanese origin.

- Fixation by copper sulphate : Copper sulphate is dissolved in sufficient water (about 2-3 times the weight of net) to form 1% solution. Then liquid ammonia is added, forming a white precipitate. Liquid ammonia is added till the white precipitate dissolves and the solution turns blue. The tannin-treated net is immersed in this solution for oxidation. The end point is indicated by the change in colour from blue to brownish black. The net is taken out, washed and then dried in shade.

- Fixation by sodium/potassium dichromate : The tannin- treated net is dipped in 1 % solution of dichromate for 2-3 hours. The net is then taken out, washed and dried in shade.
- Tarring : Tar and tar products are commonly used as preservatives. The tar is diluted with kerosene or turpentine in the ratio of 3:1. The net is in the shade. Tar treatment is better suited for nets which remain in water for longer periods and where abrasion is the major cause of deterioration.

- The tar fills up the space between the fibres and increases its strength. It also improves the weather and abrasion resistance of the fibres by forming a tough cover. The only disadvantage is that it increases the weight of the net considerably, making the net stiff and rigid.
- Chemical preservatives ; The treatment with chemical preservatives is not desirable especially in tropical conditions since more chemical decomposition occurs in strong sunlight.

- Copper sulphate : The net is dipped in copper sulphate solution (1% in case of freshwater dyeing bath and 3% in salt water bath). It is washed and dried in shade.
- Commercial preservatives: Certain commercial preservatives containing copper like garnol, cuprinol etc. are used in some countries.
- Weathering : Prolonged exposure to sunlight has a detrimental effect on both natural and synthetic fibres. This effect can be reduced by colouring using cloth dyes, tarring or tanning.

- Abrasion: It is caused by rubbing of threads and component fibres against one another and against external objects when they come in to contact. Abrasion can be reduced by tarring.
- Mechanical destruction by animals: Rats, white ants, cockroaches, etc. can damage fishing nets if the nets are not properly stored in safe places. Tarring also reduces chances of destruction by animals.

- Fouling : On prolonged submergence in water, fouler settle on the nets. This is prevented by tarring.
- Rusting: To prevent rusting, it is advisable to keep the materials away gear accessories made of iron.
- Treatment to increases stiffness: Stiffness of the material can be increased either by giving additional twist or by tarring. Stiffness is of significance in gears like trawls.

- Treatment to prevent knot slippage: Slippage of knots leads to distortion of meshes which effect the efficiency of gear. Knot slippage can be prevented by heat setting and stretching. It can also be tackled by use of glue or tar. However, this treatment increases the stiffness of the twine. Braiding with double knots reduces the problem of knot slippage.



- Storage of nets : Improper storage of nets results in considerable damage to the gear. The nets should preferably be washed immediately after use and dried in shade. A wet net piled up under a tight cover may be quickly ruined by bacteria mildew.
- Nets should be stored loosely suspended in a well-ventilated shelter with a free circulation of air. If it is necessary to heap the nets, liberal quantities of salt should be used between the layers of twine.