

Studies on the Insect Infestation of Cured Fish and their Control

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Insect infestation of dried fish is a major problem in tropical areas. Drying of fish on the beach makes it more susceptible to insect infestation. Dipterans belonging to the family Calliphoridae, Sarcophagidae and Muscidae and beetles of the family Dermestidae and Cleridae are the major insect pests. The Dipterans infest the fish during the drying process while the beetles during storage. Studies on the behaviour of these pests are discussed and control measures based on the ethological studies are recommended.

Key words : Cured fish, blowfly, beetles

Insect infestation is a menace to fish curing. It is prominently seen in tropical countries where there are chances of greater spoilage of cured fish. Insect infestation can result in total discarding of the fish. Weight loss and nutritional loss occur, ultimately leading to economic loss for the fish curers. Most often these factors are rarely taken into account, because the industry is scattered and very little data is available on curers. Moreover, since curing largely depends on the fish landings and climatic conditions, no proper documented data is available on the exact quantity processed.

The different pests commonly infesting cured fish are Dipterans like *Chrysomya megacephala*, *Chrysomya albiceps* (Calliphoridae) *Sarcophaga* spp. (Sarcophagidae) and *Musca domestica* (Muscidae), beetles like *Dermestes maculatus*, *Dermestes ater*, *Dermestes frischii*, *Dermestes carnivorus* (Dermestidae), *Necrobia rufipes* (Cleridae) (Johnson & Esser 2000, Kalaimani *et al.*, 1987) and mites like *Suidesia nesbetti*, *Lardoglyphus konoi* (Acaridae) (Hughes, 1976).

The present study was undertaken to identify the pests infesting the fish during the curing process in curing yards of Calicut, the type of damage caused and to recommend some control measures based on the ethology of the insect pest.

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Materials and Methods

Sampling of blowflies infesting the curing area had been done by placing sticky targets around the curing area, both inside and outside the curing sheds. These were then collected and identified using a microscope, with the help of a key (White *et al.* 1940).

Packed fish samples were collected from the curers and examined for beetle infestation. Beetles and their larvae were also collected from the sheds where dried fish was stored in bulk quantities in polythene covers with the help of a brush and identified in the laboratory. A stock culture of the blowflies and beetles were kept in the laboratory. Observations were also made on the behaviour of these insect pests in the curing and storage sheds. Experiments were conducted in the laboratory to determine the behaviour of the adults and larvae towards light.

Results and Discussion

Dipterans cause most of the damage during the initial stages of drying of the fish. It is found that *Chrysomya megacephala* is the major blowfly infesting the dry fish. It is usually the unsalted or light salted fish that are easily infested. (Wall *et al.* 2001) have also observed that of the Dipterans infesting cured fish the major infestation is caused by *Chrysomya megacephala* which contribute to about 95% of the total infestation. It has been observed that the population density of the dipteran pest is maximum during the post monsoon period, when the fish landings are high and plenty of fish are dried. The flies oviposit in the gill region or abdomen. Within a short period the larvae feeds on the flesh and the fish is ultimately reduced to its bones. This is more pronounced when the fish is dried on the sand/ beach, where the cool sand just below the beach surface is favourable for the maggots, to burrow, pupate and develop into an adult.

Prevention of insect infestation includes physical measures like screening, use of trapping system or chemical methods like dips in insecticides and sprays. (Proctor & Kordyl, 1978). Fumigation of the storage areas is also practiced (Friendship, 1989). Most of the governments have banned the use of any chemicals directly on to the fish. It is not possible to physically screen an entire drying area, since the curing yards are widely scattered along the coastline and drying is wholly dependent on sunlight as its source of heat.

Experiments conducted recently showed that maintaining clean surroundings, disposing the waste properly, using fresh and unspoiled fish for curing, covering all waste water outlets and practicing appropriate cleaning schedule reduced the blowfly infestation considerably.

Two beetle species, *Dermestes maculates* and *Necrobia rufipes* were observed in the present study. Experiments conducted by growing these two species in a container with dried anchovies showed that *D. maculates* is a voracious feeder and competes out *Necrobia rufipes* when grown together in the same container. The beetles laid their eggs mostly under the operculum of the fish where the salt content was low and at the same time they were protected from adverse conditions. When dry air was circulated over the eggs they failed to hatch and maximum hatching rate was observed when a source of humidity, like moistened cotton was provided in the rearing containers in the laboratory. The larvae from the infested dried fish could be removed by spreading in a thin layer over a raised wire mesh frame and providing sufficient lighting from the top. Since the larvae of the beetle pests are negatively phototropic they moved down through the wire mesh where they were collected and destroyed. The lighting was able to dry up the eggs laid by the adult beetles. The eggs go undetected during packing. Very often the beetles are seen only when the cured fish reach the consumer. Losses are heavy in places where the fish is stored for a long period.

To minimize loss due to beetle infestation the storage yards have to be kept clean without any remnants of improperly dried fish. Aeration has to be ensured in storage sheds so that humidity does not increase. Cracks and crevices in the storage sheds should be filled up as these are places where the beetles hide. The fishes should be salted in such a way that salt penetrates beneath the operculum. Fumigation of the dried fish has been practiced only in large godowns, or merchant stores, which will prevent development of the beetle eggs. In this case there is always a chance of reinfestation.

It is concluded that insect infestation is a real problem for the traditional fish processor, who has very little knowledge of hygiene or sanitation practices. It becomes imperative that the authorities and the community at large have to work together in providing better infrastructure, and appropriate training in curing, drying, packaging and storage. This will bring in desirable changes in the processing practices and ensure a better quality cured and dried product.

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