SCIENTIFIC NOTES

MAMMALIAN PESTS OF MUGA SILKWORM CROP

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Muga Silkworm *Antheraea assamensis* Helfer is not only known for its unique golden coloured cloth fabrics, but also for its delicious test and nutrient values. The pupa of this semi domesticated silkworm variety has been using in different traditional delicious food item preparations by the indigenous tribes of north eastern region of India. These preparations are popular for their test and flavor among the peoples since time immemorial. In present development of science and technology also establishes its high nutritive and medicinal values for certain physiological disorders including diabetes. Silkworms are the most nutritious food with high source of proteins, calcium, magnesium, sodium, iron and vitamin B1, B2 and B3, besides having low content of fat. Silkworm contains 54% protein (%kcal), 43% fat (%kcal), 0.5% calcium (mg/kcal), 0.6% phosphorus (mg/kcal) which are comparatively higher than other insects. Thus, naturally the silkworm invites a comparatively large numbers of pests and predators that feed on them causing a considerable loss to the silkworm crop. To protect themselves silkworm have no such devices that can protect from the pests and predators. They cannot jump, escape or hide, and also slow moving. Since silkworm has no sharp jaws or legs, they cannot bite or harm to others. Their bodies are also soft facilitating easier to shallow and digest.

So naturally due to high nutritious value silkworms are the preferred feed for so many pests and predators of which some are mammalian predators. These mammalian predators in north east India conditions cause great havoc to the silkworm crop production. Sometimes depending upon localities they are solely responsible for crop failure.

Squirrels are very commonly occurring mammalian pest of a good number of agricultural crops including coconut, areca nut, maize, banana etc. Depending upon localities with unavailability's of their food and also human communities as their flesh is used as food by certain communities, their population is found from very rare to highly thick in North Eastern India. This small animal belongs to order Rodentia, family Sciuridae of vertebrate. Squirrels are quick and fast moving animal, expert in climbing trees generally live in trees, tree trunk holes. The most common to this region is three striped tree squirrel (*Funambulus palmarum*) which is diurinal. They are omnivorous in food habits, cannot digest cellulose compelling on foods rich in protein, carbohydrates and fats. Muga silkworms at 4th and 5th larval stages are very good nutritious supplement in their diet. In muga growing areas, they are found in considerable numbers facilitated by other plant canopy nearby the silkworm food tree plantation. Squirrel control in muga crop is still not achieved as any effective physical or mechanical or chemical measure still not coming into force.

Another important mammalian silkworm pest is wild rabbit (*Sylvilagus brasiliensis*) living in nearby forest vegetation. They belong to Leporidae family of

order Lagomorpha. These small wild rabbit although herbivorous in food habit they prefer to eat healthy muga silkworm larvae. They consume crawling larvae coming down and moving on soil due to different reasons. Since rabbit cannot climb the Som or Soalu plant they do not harm larvae that are in trees. During the time of cocoon formation when ripen larvae came down the trees ('joom' assembling) in search of suitable place for cocooning, rabbit cause maximum loss even in night time if no measures are taken. This pest is found in almost all muga culturing localities of Assam.

Bats are very destructive mammalian silkworm pest widely occurring in most localities of Assam. In Assam generally two types of Bat are found of which one smaller size is known as insect eating placed in suborder Microchiroptera and, other is bigger size of fruit eating under Megachiroptera suborder. Under these two suborders species like *Sphaerias blanford*, *Pteropus sp., Rousettus leschenvelti, and Cynopterus sphinx* are found in Assam. The smaller sized bats habitat in house, unused houses, tree trunk holes, granaries, commonly dark undisturbed places where hiding scopes are available. The bigger sized bats generally live in group of undisturbed dark remote localities preferably in abandon houses, godowns, big trees, stone caves etc. But during night they come out for search of food and fly to long distances. In villages and rural areas, insect eating bats are invariably found flitting around cow shads and field. Bats are migratory installing a unit after they leave will insure they won't use it again. Throughout the world there are many species of bats. In fact, bat comprises the largest segment of mammals in the world. It is estimated that over 25% of the worlds mammals are bat. Although bat has strong teeth, they will not use them for chewing through material. In food habit bats are carnivorous. Since bats eat diverse group of insect including the insect pests they are known to be beneficial. Further, bats have the ability to keep mosquito population down. But in muga silkworm cropping, bats are of serious concern as pest. They chew the juice of the matured larvae with multiple dissections. To get ride of bat loss farmers use nylon net of bigger size over the food plantations that restrict the bats in reaching muga larvae. This mechanical control measure is of costly that every farmer cannot afford it. One electronic device of ultrasound can be used as bat repellant since ultrasound has been found to work well at repelling birds, rats, mice and bats. The sounds emitted are that of an animal in distress which in turn alarms the nesting or roosting colony. The theory is that the colony should than become wary of the nest sight and move out. Ultrasound has no penetrating capabilities and can only reach about 25 feet away from the transducers effectively. Once targets are more than 30 feet away they will acknowledge the distress sound but will not generally move away.

Foxes are common mammalian animal found in almost thin forest like vegetation throughout the state of Assam. Foxes are completely carnivorous lived on preying other smaller sized domestic as well as wild animals. They also feed on dead bodies of all kinds. Foxes eat live insects of different groups. During the time of joom assembling by ripen larvae at the tree base, foxes use to eat the ripen larvae if continuous watching and scaring way is not taken to the muga crop. Since muga cropping is practiced in outdoor Som or Soalu plantations it becomes easy for the foxes living nearby forest like vegetation. Although different types of foxes are found all over the world, generally two types of foxes are noticed in Assam. One is of smaller in size with grey coloration. This type of fox commonly live hiding underground nearby riversides, lone areas. The other type is a little bit bigger in size like medium sized dog and reddish-brown in color. They live nearby

thin forest like vegetation away from human habitat. Fox belongs to the family Canidae under order Carnivora and genus *Vulpes*.

Rats are very thickly populated mammalian pest of a good number of agricultural crops. Besides, rats are also responsible for spreading some of important diseases and causes damages to household materials including cloths, plastic-wooden utensils, fire from electricity, flood by weakening the river dams by intensive burrowing, derailing by weakening the railway track etc. They live most commonly in human habitat, sewages, jungles, railway tracks, crop fields, cannel dams etc. They belong to Rodentia family of vertebrata. Rodents are of different types in their body size, color, nature, habitat, and body characters. In Assam six different species of rodents are found. Out of these *Rattus rattus* (Indian mole rat), *Rattus norvegicus* (sewage rat) and *Mus mascullus* (house mouse) are found to live in house where foods are easily exposed for their consumption. The other three species are *Bandicota bengalensis, B. indica* and *Mus mus* (field mouse). Rats are omnivorous animal. Although their main food is staple food grains, they eat meat of other organisms. The species *B. indica* lives in forest, horticultural gardens, and jungles of nearby crop fields. Being nutritious the muga silkworm larvae and pupa are eaten by rats. Rats are good climber and can climb Som or Soalu plant for their food. Being nocturnal it is difficult to protect muga silkworm larvae from the rats, particularly when there is scarcity in availability of other food items in their habitat.

Members of Primates are different species and traits of commonly called monkey. In Assam different species of this Primate group are abundantly found in different habitats conditions starting from dense forest to horticulture gardens to temple premises. They are different in size, body colour, appearance, habits etc. Monkey range in size from the Pygmy Marmoset at 140 to 160 millimeters(5-6 inch) long(plus tail) and 120 to 140 grams in weight, to the male Mandrill, almost 1 meter (3.3 ft) long and weighting 35 kg. Diets differ among the various species but may contain any of the following – fruit, leaves, seeds, nuts, flowers, eggs and small animals including insects and spiders. Muga larvae of 4^{th} and 5^{th} instars when become flashy are most favorite diet of the common monkey. Monkey being intelligent than any other animals, apply improve technique to collect and carry muga larvae from the crop field. They come to the muga crop on Som or Soalu trees and carry the larvae by keeping in large number on their bodies. Since monkey is cleaver animal, farmers face great problem in controlling their infestation. Moreover, there is no known controlling method for monkey.

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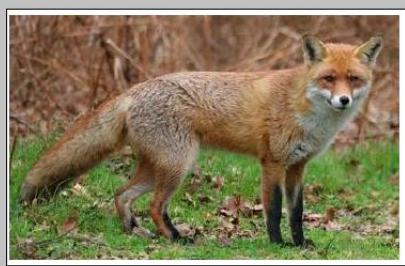
Tree Squirrel

Outdoor Rabbit

Himalayan Bat (Fruit Bat)



Medium sized Indian Fox

Rat

Common Monkey

PICTURES OF MAMMALIAN PESTS OF MUGA SILKWORM CROP THAT CONSUME MATURE LARVAE AS FOOD.