



A study on assessment of various mulberry and silkworm pests at farmers' level in the major traditional districts of West Bengal

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Abstract

Present study has been undertaken to assess the infestation of various pests of mulberry and silkworm at farmers' level in major traditional belt of Sericulture in West Bengal. Among the various kinds of mulberry pests three major pests are common at farmers level, among them Tukra, White fly and Thrips are important. Mulberry crops of 100 % of small farmers and 100% of big farmers are affected by Tukra infestation. Average crop loss is also higher in case of both small farmers and big farmers. Almost 16 % crop loss is found in case of small farmers and 10% crop loss is found in case of big farmers. Almost 27 % crop loss in case of small farmers and 21% crop loss in case of big farmers are happened due to thrips infestation at farmers level in West Bengal. Crop of 100 % of small farmers and as well as 100 % of big farmers are affected by this disease. Almost 25 % crop loss in case of small farmers and 19% crop loss in case of big farmers are happened due to white fly infestation at farmers level in West Bengal. Crop of 70 % of small farmers and as well as 50 % of big farmers are affected by this pest. Present investigation reveals that white fly infestation is most common in Malda District rather than other traditional district. Present study reveals that most of the farmers are reluctant to use any types of control measures regarding the management of mulberry diseases and pests. Present study reveals that Uzi fly is the Key pest of Silkworm *Bombyx mori* L. An average of 25 % crop loss in case of small farmers and 15% crop loss in case of big farmers are happened due to Uzi infestation at farmers' level in West Bengal. At farmers level any incidence of Dermested beetle was no recorded. In case of mulberry cultivation awareness of disease and pest control measures are much lower than even controlling of silkworm diseases and pests.

Keywords: Mulberry, Silkworm, Pest

Introduction

The growth and development of silkworm larvae and economic characters of cocoons are influenced largely by the nutritional quality of mulberry leaves fed. Matsumara *et al.* (1958) reported that out of the various characters responsible for success of cocoon crop mulberry leaf stood first (38.2%) followed by climate (37%), rearing techniques (9.30%), silkworm race (4.02%), Silkworm eggs (3.10%) and other factors (9.60%) etc. Nearly 70% of the silk protein produced by the silkworm is directly derived from the protein of the mulberry leaves (Fukuda *et al.*, 1959). So it has a huge economic importance. All commercial varieties are fast growing and produce nutrient rich leaves; hence attracted many more pathogens and pests. Excessive use of fertilizer, cultural malpractices and perennial nature of its own also make it a good harbour of many diseases (Dandin *et al.*, 2003). Mulberry is seriously affected by many sap sucking pests, few of them cause major damages and economic harm in West Bengal every year. Remarkable suckers of the few are mealy bug, white fly and thrips (Govindaiah *et al.*, 2005 Mukhopadhyay, 2006 and Sarkar *et al.*, 2008). In case of Mealy bug affected portions of shoot are malformed showing flattening and thickening of it, reduction of internodal distance causing wrinkling and curling of the apical shoot. Apical leaves become thick, twisted, leathery to show bushy appearance and seriously affected leaves become dark green in colour, turn pale yellow and fall off before maturity. Affected portions of plants become brittle and show white mealy substance on it (Dandin, *et al.*, 2003, Govindaiah *et al.*, 2005). It has been estimated that leaf yield loss due to mealy bug infestation West Bengal is around 7.9 to 11.03% (Mukhopadhyay, 2006). Feeding with tukra infested mulberry leaves result in commercial characters related to silk production of silkworm. The Economic Threshold level (ETL) for mealy bug is 10 individuals/ Plant. White fly is a potential vector of leaf curl virus causing leaf curl disease. Honey dew secreted by nymphs serve as a medium for the growth of sooty mould fungus (*Chaetothyrium* sp & *Curvularia affinis*) causing sooty mould disease of mulberry which particularly during September-February. Feeding whitefly infested leaves to silkworm causes depletion in economic parameters of silk worm rearing. The leaf yield loss due to whitefly infestation is 23% ((Bandyopadhyay *et al.*, 2000). In case of thrips infestation the symptoms include depletion of moisture, reduction in crude protein content and total sugars, affected leaves show yellow streaks in the

early stage of attack. Whereas yellow blotches are observed at advance stage of the attack which become yellowish on maturity, leaves become leathery and boat shaped, pre-mature leaf fall. The leaf yield loss due to whitefly infestation is 23%. Feeding thrips infested mulberry leaves caused deterioration of economic parameters of silkworm rearing and cocoon characters. It has been estimated that leaf yield loss due to thrips infestation was 1300 kg/acre/ season (Feb-June) (Mukhopadhyay, 2006 and Sarkar *et al.*, 2008).

Infestation of Silkworm Pest is also common in West Bengal. It is reported that key pest of silkworm Uzi fly spreads in South India from West Bengal through seed cocoons (Dandin, 2003). Sarkar *et al.*, 2020 clearly indicates that Uzi infestation in West Bengal is more in rainy season followed by summer. But in winter season infestation is almost negligible. In case of Uzi infestation, the silkworm larvae infested in the 3rd, 4th and early 5th instars invariably die before they reach the spinning stage. Usually, the death of the silkworm occurs when the maggots of the uzi fly have attained maturity. When the infestation of the uzi fly occurs in the late 5th stage silk worm larvae, cocoons are built, but the mature maggots pierce the cocoon and come outside, Thereby rendering the cocoon unfit for reeling. Dermestid Beetles belong to the family Dermestidae of order Coleoptera often attack pupae and adult silkworms in the grainages. Dermestid beetles cause extensive damage to the stored cocoons, cause 2-3% loss in egg production and 20-30% loss in reeling cocoons when they are stifled and stored for longer duration for 3-4 months (Chattopadhyay *et al.*, 2004). So the present study has been undertaken to assess the infestation of various pests of mulberry and silkworm at farmers' level in major traditional belt of Sericulture in West Bengal.

Materials and Methods

By adopting purposefully random sampling, sample of 200 respondents, 100 each from small farmers (land holding capacity 1 acre or less than 1acre) and big farmers (land holding capacity more than 1 acre) of Nabagram Block of Murshidabad District, Kaliachawk Block-2 of Malda District and Nalhati Block-1 of Birbhum districts were selected to assess various pests of Mulberry and Silkworm at farmers' level. The respondents were interviewed to elicit information in various aspects of silkworm disease and pest. Data pertaining to the related topic was collected after three visits in November, 2016, February, 2017 and April,

2017 crop by personally interviewing with the aid of design questionnaire (Ray & Mandal, 1997) and interpreted.

Target group

Sericultural farmers who are actively engaged traditionally in sericulture are considered as target group in both the traditional district.

Results and Discussion

Among the various kinds of mulberry pests three major pests are common at farmers level, among them Tukra, White fly and Thrips are important. Occurrences of Tukra caused by Mealy bug (*Maconellicoccus hirsutus*) (Green) are mostly common during April-June (Table: 4). Mulberry crops of 100 % of small farmers and 100% of big farmers are affected by this Pest (Table: 1, Fig.1). Due to polyphagous habit of this pest, this pest is known as “hard to kill pest” (Sarkar *et al* 2008). Average crop loss is also higher in case of both small farmers and big farmers. Almost 16 % crop loss is found in case of small farmers and 10% crop loss is found in case of big farmers (Table: 2, Fig.2).

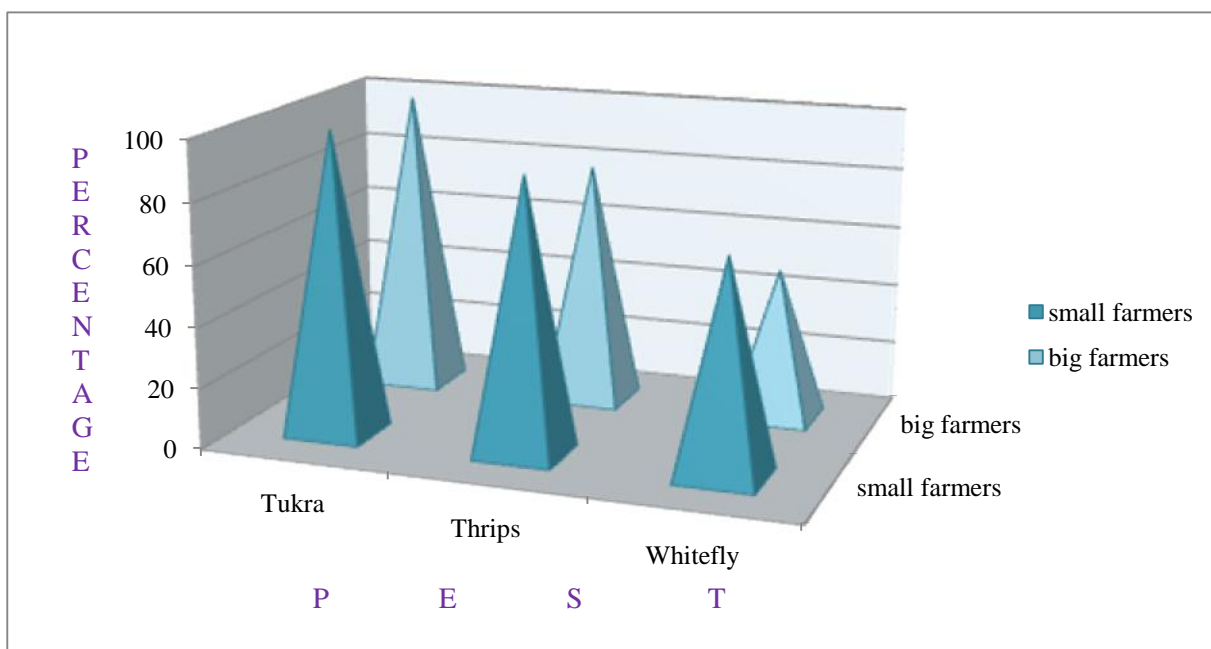
Infestation of Thrips are very common at farmers level during April-May (Table: 4). Leaves become boat shaped due to thrips infestation (Sarkar *et al* 2008). Almost 27 % crop loss in case of small farmers and 21% crop loss in case of big farmers are happened due to thrips infestation at farmers level in West Bengal (Table: 2, Fig.2). Crop of 90 % of small farmers and as well as 80 % of big farmers are affected by this disease (Table: 1, Fig.1).

White fly, *Dialeuropora decempuncta* (Quaintance & Baker) of class: Insecta; order: Hemiptera is polyphagous and serious pest of mulberry causing great economic loss by reducing the leaf yield in West Bengal and Assam (Bandyopadhyay *et al*, 2000). White fly infestation occurs during the month of September to October. Almost 25 % crop loss in case of small farmers and 19% crop loss in case of big farmers are happened due to white fly infestation at farmers level in West Bengal (Table: 2, Fig.2). Crop of 70 % of small farmers and as well as 50 % of big farmers are affected by this pest (Table: 1, Fig.1). Present investigation reveals that white fly infestation is most common in Malda District rather than other traditional district.

Though in tropical condition mulberry can be grown throughout the year and soil of Malda and Murshidabad District are favourable for the growth of mulberry but farmers of West Bengal are facing lot of problems in terms of production of quality leaves. Present study reveals that most of the farmers are reluctant to use any types of control measures regarding the management of mulberry diseases and pests. This observation is similar to the observations laid by Sarkar *et al* (2008). According to them only 4 % small farmers and 8 % big farmers know about the recommended control measures for diseases and pests for mulberry cultivation. It is true that Farmers are still not adopting proper disinfection procedures for controlling silkworm diseases and pests (Sarkar *et al* 2008). But in case of mulberry cultivation awareness of disease and pest control measures are much lower than even controlling of silkworm diseases and pests.

Table: 1 Assessment of various Mulberry Pests at farmers' level

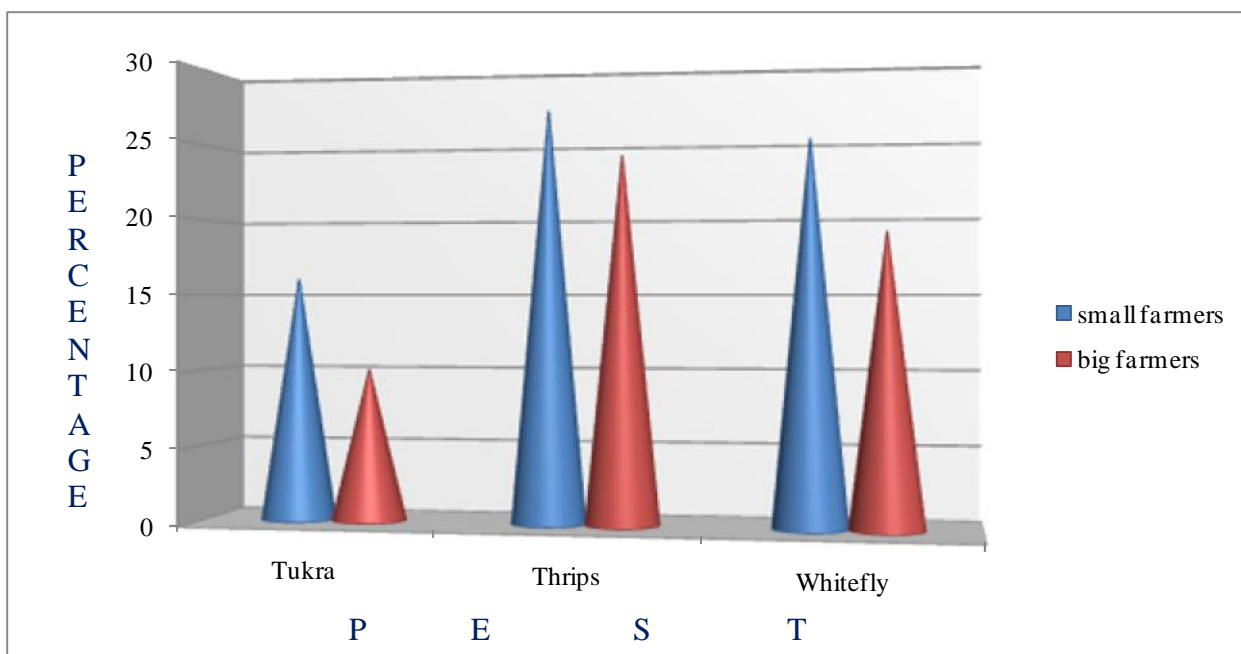
| Sl no. | Pest | Rate of infestation in case of small farmers | | Rate of infestation in case of big farmers | |
|--------|----------------------|--|------------|--|------------|
| | | Number | Percentage | Number | Percentage |
| 1. | Tukra infestation | 100 | 100 | 100 | 100 |
| 2. | Thrips infestation | 90 | 90 | 80 | 80 |
| 3. | Whitefly infestation | 70 | 70 | 50 | 50 |



Source: data collected during survey in Kaliachawk Block-2 of Malda and Nabagram Block of Murshidabad District and Nalhati Block of Birbhum District

Table: 2 Leaf yield loss at farmers level due to different pests attack in different seasons

| Sl no. | diseases | Seasons/crop | Average leaf yield loss in case of small farmers | Average leaf yield loss in case of big farmers |
|--------|----------------------|--------------|--|--|
| 1. | Tukra infestation | April-June | 16% | 10% |
| 2. | Thrips infestation | April-May | 27% | 21% |
| 3. | Whitefly infestation | Sept-October | 25% | 19% |



Source: data collected during survey in Kaliachawk Block-2 of Malda and Nabagram Block of Murshidabad District and Nalhati Block of Birbhum District

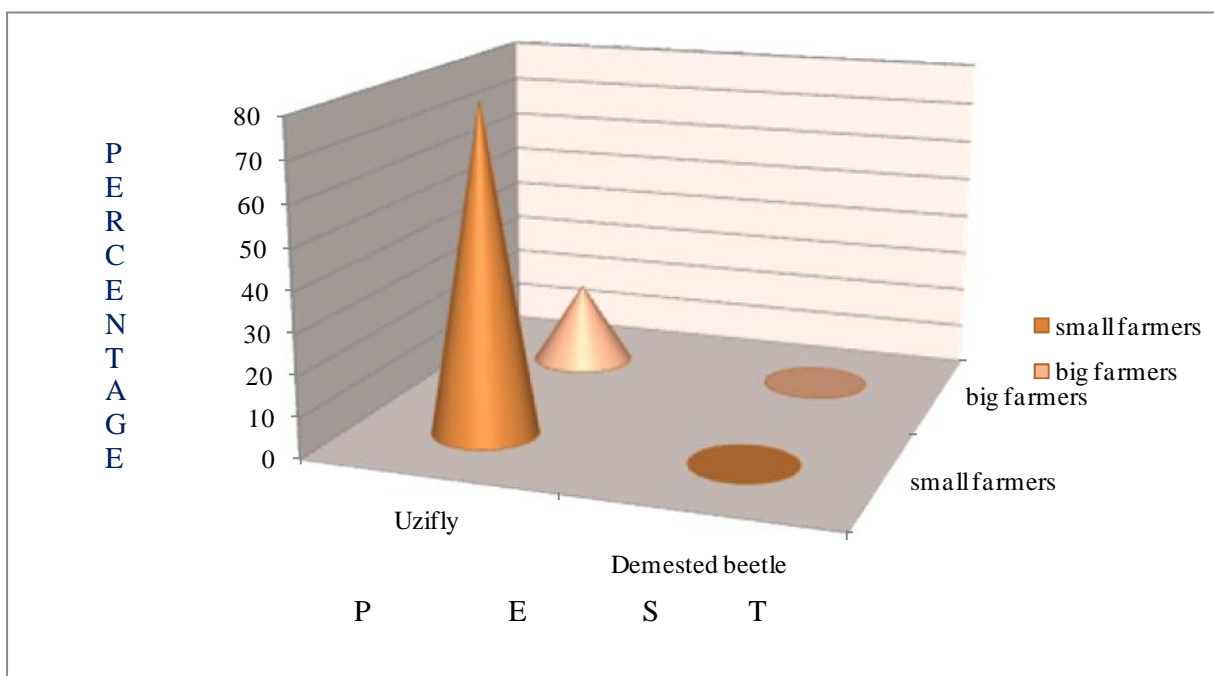
Among the silkworm pests, Uzi fly, *Exorista bombysis* (Louis) (Diptera: Tachinidae) is a severe endo-larval parasitoid of the silkworm, *Bombyx mori* L. Present study reveals that Uzi fly is the Key pest of Silkworm *Bombyx mori* L. An average of 25 % crop loss in case of small farmers and 15% crop loss in case of big farmers are happened due to Uzi infestation at farmers level in West Bengal (Table: 4, Fig.4). Crop of 80 % of small farmers and 20% of big farmers are affected by this disease (Table: 3, Fig.3). This observation is similar to the observations laid by Bhattacharya *et al.*, 1993 b and Chakraborty *et al.*,

1996. According to them Crop loss due to Uzi infestation was reported to be 0.008-11.6% in West Bengal (Bhattacharya *et al.*, 1993 b; Chakraborty *et al.*, 1996).

Dermisted Beetle is generally a grainage pest. These pests are generally attracted by the smell of stifled cocoons or preserved pierced cocoons. In commercial grainages beetles generally eat dried pupae inside the cocoons by piercing the cocoon shell. So at farmers level any incidence of Dermisted beetle was no recorded (Table: 4, Fig: 4).

Table: 3 Assessment of various Silkworm Pests at farmers' level

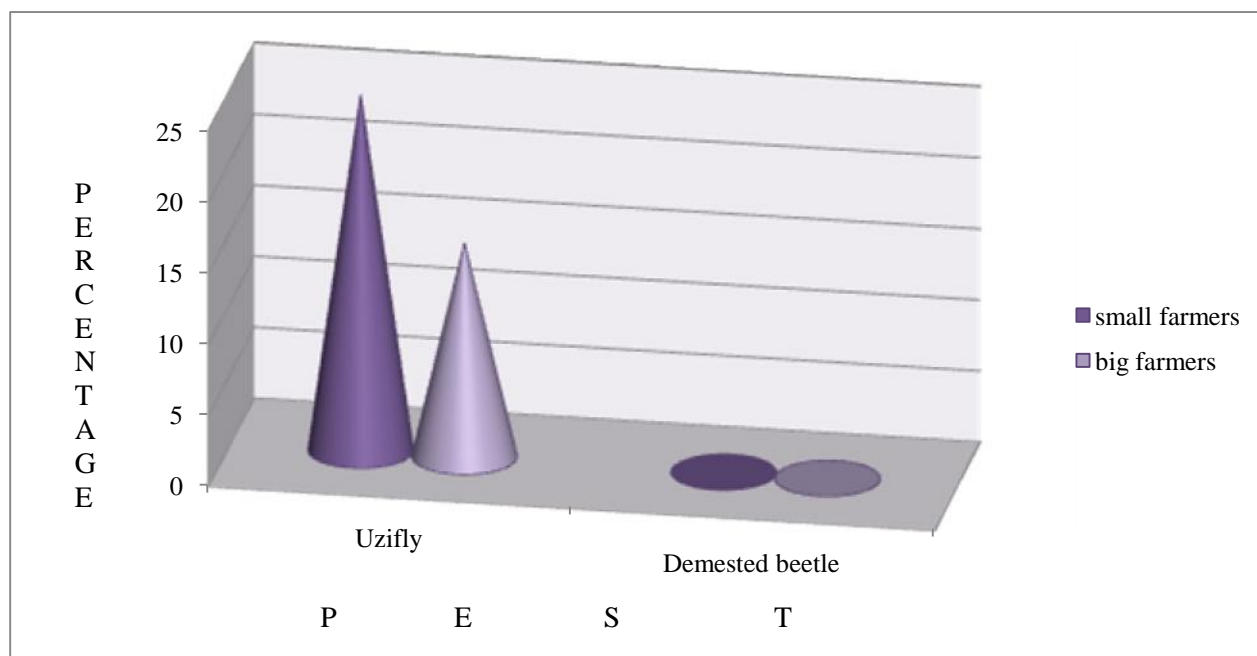
| Sl no. | Pest | Rate of infestation in case of small farmers | | Rate of infestation in case of big farmers | |
|--------|------------------|--|------------|--|------------|
| | | Number | Percentage | Number | Percentage |
| 1. | *Uzifly | 80 | 80 | 20 | 20 |
| 2 | *Demested beetle | - | - | - | - |



Source: data collected during survey in Kaliachawk Block-2 of Malda and Nabagram Block of Murshidabad District and Nalhati Block of Birbhum District

Table: 4 Crop loss at farmer's level due to different pests in different seasons

| Sl no. | diseases | Season | Average crop loss in case of small farmers | Average crop loss in case of big farmers |
|--------|------------------|--------------|--|--|
| 1. | *Uzifly | Rainy Season | 25% | 15% |
| 2. | *Demested beetle | - | - | - |



Source: data collected during survey in Kaliachawk Block-2 of Malda and Nabagram Block of Murshidabad District and Nalhati Block of Birbhum District

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