GENERAL INTRODUCTION

Bombyx mori L., also commonly known as silkworm is a monophagous insect reared in captivity (sericulture). Sericulture is an agro-based rural industry, involved in food plant cultivation and silkworm rearing for production of raw silk which is the yarn obtained out of cocoons spun. Sericulture provides vibrancy to village economies by enhancing employment specially women. The physiology of silkworm has been studied comprehensively due to economically valuable silk production. Silk known to be a "Queen" of textile, is only natural animal fibre. Human beings have benefited by the silkworm in various ways, therefore scientists have been continuously trying to improve the techniques of silkworm rearing.

Besides environment and technology adaptation, foliar nutritive value is the most important factor for larval growth, silk production and fibre quality (Purohit and Pavankumar, 1996; Nagaraju, 2002; Seidavi *et al*., 2005). The mulberry leaves have considered as a sole source of food for silkworm larvae. The leaves best for rearing are those containing more moisture, protein, and carbohydrates along with less ash and fiber. The production of leaves along with their nutritional qualities for silkworm needs varietal comparison.

Different morphological and physiological attributes are considered to develop high yielding mulberry varieties (Susheelamma *et al.,* 1988; Sahu *et al.,* 1995). Foliar biomass and yield of different crops depend on the CO_2 assimilation through photosynthesis (Menon and Srivastava, 1984). Photosynthesis is a foremost physiological attribute that is directly correlated with stomatal frequency of the leaves. Susheelamma and Jolly (1986) reported that adaptation of mulberry in tropical region of India is dependent on stomatal size and stomatal frequency present on mulberry leaves. In the recent past, stomata are a prime morphological feature of the leaves that have been studied from the taxonomical view point (Fagundez and Izco, 2011; Kaya *et al.,* 2011). Trichome is another major micro-morphological attributes of leaves. Baur *et al.* (1991) reported that the presence of trichome on leaf surface constitute a mechanical barrier that hinders herbivory insects feeding.

Beside morphological attributes, the foliar nutritional value and biomass production also depends on the weather and agricultural practices, and it was different for a variety of mulberry genotypes. Mulberry genotypes produced high biomass. Mulberry cultivars had a fabulous water demand due to more rapid growth rate and higher metabolic activities. Water scarcity can clutch mulberry plant growth and metabolism. Hence, plants experience oxidative stress that reduces production of plant metabolites and reduction of plant production affects larval growth and

subsequently silk production. Several reports were published on oxidative stress of mulberry plant, and scientists have concentrated on the responses of enzymatic antioxidants.

Sericulture in West Bengal, a humid sub tropical region of India, suffers a major problem due to lack of adequate quantity of mulberry leaves with high foliar nutrition throughout all season. There is an opportunity to increase silk production from present, but is possible only when more mulberry cultivars are explored for rearing to meet overall leaf requirement in sericulture. Therefore, it becomes essential to select mulberry cultivars, which can sustain normal growth of larvae during all season for better yield.

Optimal nutrient and favourable physical features are required for larval growth and silk production. In research world numerous attempts were made to enhance productivity of sericulture through silkworm larval growth and improvement of economical attributes. Plants are considered as a richest resource of phytochemicals and these phytochemicals have been reported to manipulate the life cycle and activity of different insects. The effects of different types of dietary protein on silkworm growth were affirmed by using semi-synthetic diets. Some workers have clearly described that protein acts as an essential ingredients in silkworm diet for their growth and silk production. Several reports stated that the soybean meal as a protein source in silkworm diet can significantly increase the weight of silkworm larvae and fresh silk glands. Since smaller proteins have also been considered as peptides, therefore it may be predicted that these peptides might also have significant effect on the growth and development of silkworm.

In recent years a large number of biologically active peptides have been isolated from fungal, bacterial, plant and animal sources. Naturally occurring peptides are found to regulate several physiological processes in plants and animal system also. Among them, few are well characterized by scientists. Peptides in plant system play a definite role in amplifying signals, nitrogen fixation, cell proliferation and generation of polarity (Souter and Lindsey, 2000). Not only plant system, peptides also regulate different metabolic activities and organ development of insects. Bombyxin, an insulin-related peptide, had an effect on the activity of glycogen phosphorylase, promotes cell proliferation, ovary development and involved in the pupal commitment of wing imaginal discs in different insects. Few peptides had a role on oxidative stress management system. It may be possible that peptides from other source help to reduce oxidative stress in silkworm larval midgut which is generated due to allelochemicals interaction with their host plant and also promote larval growth.

However, the role of naturally occurring plant peptides on quality enhancement in terms of bio-efficacy of cocoon production and oxidative stress physiology of silkworm are not yet studied so far. More precisely no scientific investigation was performed on purification and characterization of mulberry peptides and their role on enhancement of silk fibre quality. It was already established that low molecular weight peptides had different biological activities. Mulberry leaf peptides could also have some influence on silkworm rearing and silk production. Considering the previous reports, the present study was undertaken to investigate the role of low molecular weight mulberry peptides and different plant growth regulators on silkworm rearing. Peptide mediated oxidative stress management was also investigated. Fibre quality and other post cocoon attributes were explored further.

The objectives of research work are

1. Determination of genotypic variability of anatomical characteristics related with feeding preference
2. Isolation and purification of peptides from selected important cultivars of the mulberry leaves and their characterization
3. Evaluation of antioxidant activity of isolated bioactive peptides
4. Assessment of the effect of peptides on silkworm larval growth with seasonal variation
5. Determination of impact of peptides application on cocoon production along with silk quality
6. Assessment of the efficacy of different plant growth regulator on silkworm larval growth, pre cocoon and post cocoon attributes
7. Assessment of oxidative stresses in silkworm during cultivation and the role of antioxidants
8. Determination of antioxidant enzymes of mulberry leaves elicited with different growth regulators