I. INTRODUCTION

Sericulture, by virtue of its inherent potential, has been recognised as one of the foremost agro-bio based industries of the world. India now ranks second in mulberry silk production in world next only to China. With the advent of improved 'Package of Practices' befitting Indian climatic conditions production of mulberry silk has tuned up enormously and became a gainful avocation for the rural mass employing million of peoples (Choudhari, 1992). For getting better yield of mulberry silk and fetching better worth of the product the production of quality silkworm seed has been considered to be of utmost importance. The quality silkworm seed (eggs) is considered as the 'sheet anchor of sericulture industry'. As the quality of silkworm eggs is determined through the expression of desired economic characters such as, cocoon weight cocoon-shell weight, silk percent, leaf-cocoon ratio and fecundity of that particular silkworm race so also the expression of good economic characters largely depends on the environment of rearing and quality of mulberry leaves. Environment being an independent factor manipulation of the same is somewhat restricted. But the quality and quantity of food can easily be altered for getting effective result. As the adult of *Bombyx mori* is non-feeding the quality and quantity of food supplied during larval stages play a vital role in body growth and in reaching full potential for expression of desired characters since a high percentage of food energy stored during larval period is allocated for egg production by adult moth (Muthukrishnan *et al.*, 1987).

Silkworm seed production system in India is phased in three tiers (P_3, P_2 and P_1) for multiplication of seed cocoons. The final multiplication of seed cocoons for production of commercial eggs is done by 'selected sericulture farmers' (P_1 seed cocoon growers). So, the expression of desired characters of a particular race during commercial rearing totally depends on the quality and quantity of food provided by P_1 seed cocoon growers during seed crop rearing.

In West Bengal, a state of India, due to varied climatic conditions four agro-seasons such as, dry part of summer, wet part of summer (rain), autumn and winter are experienced. During dry part of summer season (March to first week of June) the temperature remains high with fluctuation of humidity and mulberry leaf yield is low. During this season the silkworm seed rearers often face shortage of mulberry leaves. During wet part of summer season (middle of June to the first week of October) the leaf yield is high but due to high temperature and high humidity this season is not conducive to better seed crop rearing (Paul *et al.*, 1992). During this season due to rain, mulberry leaves harvested for feeding of silk worm larvae carry rain droplets which create outbreak of diseases (Krishnaswami, 1986). So, to manipulate the leaf short fall during the dry part of summer or to avoid feeding of wet leaves carrying water droplets during wet part of summer, seed rearers regulate feeding and abstain fifth instar silkworm larvae from feeding on any day (Samson *et.al.*, 1981). This feeding regulation or starvation stress on any day of the final instar definitely affects the desired economic characters of the seed cocoons as fifth instar larvae itself consumes 87.67% of the total food required during the life of all the larval instars (Matsumura and Takeuchi, 1950). Again, the daily requirement of food of the fifth instar increases day by day, the highest being on the day before spinning (Horie and Watanabe, 1983). So, starvation on any day of fifth instar definitely affects the formation of silk protein and the storage of energy for allocation during egg production.

In West Bengal, the commercial sericultural farmers since long used to rear the low yielding multivoltine silkworm race 'Nistari' which is highly resistant to adverse climatic conditions. During recent years a hybrid of Nistari x bivoltine male of KPGB x P_5 has been introduced for getting higher yield and better quality of yarn. This hybrid can easily be reared throughout the year (Rao, 1988). But production of this Nistari x bivoltine hybrid eggs in 'seed production centres' got restricted due to non availability of bivoltine male component during wet part of the summer season as the fifth instar larvae of bivoltine are highly susceptible to viral and bacterial diseases during hot and humid weather.

Origin of the Proposal : Keeping in view these two applied problems i.e.; a) Effect of any single day starvation during the fifth instar on the seed crop rearing, and b) Production of Nistari x bivoltine (KPGB x P_5) hybrid eggs during wet part of summer for commercial use the investigation has been aimed at.

The effect of any single day feeding regulation on economic and reproductive characters of the multivoltine race Nistari, pure bivoltine (KPGB) and a hybrid of two evolved lines of bivoltine (KPGB x P_5) were studied during both dry and wet part of the summer. It was also contemplated to understand upto what extent the starved larvae could compensate for the food quantity deprived on a particular day of 5th stage larval life after resumption of food. Juvenile hormone analogue (JHa), methoprene being a growth regulator acts as silk augmentor, was applied to 48-hr-old fifth instar larvae of all the three varieties and then subjected to day-wise feeding regulation to ascertain its effect on economic and reproductive characters and also the extent of compensation after feeding resumption. The objective of this investigation was to identify the particular day or the days of the fifth instar larvae when food deprivation should never be practised.

Bivoltine silkworm rearing is quite difficult during the wet part of summer season as the fifth instar bivoltine larvae are very much susceptible to viral and bacterial diseases in hot and humid climate. But for the production of multi x bi hybrid eggs in commercial use by sericultural farmers rearing of bivoltine during wet part of summer season is very essential. Imidazole compounds like KK-42 (1-benzyl-5 imidazole), KK-110(1-neopentyl-5 imidazole), KK-22(1-citronellyl-5 phenyl imidazole) are known to be potent inducer of precocious metamorphosis in *Bombyx mori* larvae with the formation of trimoulter miniature but viable adults (Staal, 1986). References indicate that better management of rearing is possible through the application of imidazoles as these compounds shorten the larval duration inducing tetramoulter to become trimoulter with a very low incidence of diseases and better pupation rate. So, it was intended to select a suitable dosage of different imidazoles (KK-42, KK-110, KK-22) to induce viable trimoulter bivoltine during the wet part of summer and also study the effect of the action of these imidazoles on economic and reproductive characters. It was also attempted to make use of these trimoulter male moths for the preparation of multi x bi hybrid eggs and use of these hybrid eggs in commercial rearing.

In this dissertation an attempt has been made to investigate the following aspects :

1. Effect of any single day food deprivation during the fifth instar larval life of *Bombyx mori*, race Nistari ; KPGB and KPGB X P_5 both without and with the treatment of the JHa, methoprene during dry part of summer and wet part of summer on.

1.1 Consumption and utilization of food

1.2 Efficiency of conversion of digested food

1.3 Economic parameters

1.4 Reproductive parameters

1.5 Utilization of leaf nitrogen.

2. Use of KK-42, KK-110 and KK-22 (imidazole compounds) for induction of trimoulters on larvae of KPGB X P_5 during wet part of summer.

2.1 Determination of effective dose for optimum induction of trimoulters

2.2 Comparative performance of KK-42, KK-110 and KK-22 with selected doses on :

- 2.2.1 Food consumption and utilization
- 2.2.2 Efficiency of conversion of digested food
- 2.2.3 Rearing performance
- 2.2.4 Reproductive performance
- 2.2.5 Use of trimoulter bivoltine male for production of polyvoltine X bivoltine hybrid and its rearing performance.
- 2.2.6 Rearing performance of trimoulter eggs during next generation.
- 2.2.7 Utilization of leaf nitrogen.