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Influence on the overall performance of the mulberry silkworms, bombyxmori l.CSR-18, CSR-19 and Kolar Gold cocoons reared with M5 mulberry leaves irrigated by distillery spentwash

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Abstract*—CSR-18, CSR-19 and Kolar Gold silkworm reared with M5 variety of mulberry plants irrigated by raw water, 50% PTSW and 33% PTSW. The different parameters such as raw silk (%), filament length (m), reelability (%), denier and shell ratio were determined at the maturity of cocoons. It was found that the parameters were better in cocoon irrigated with 33%PTSW compared to 50%PTSW and raw water irrigations. This concludes that the mulberry plants irrigated with 33%PTSW were enriched with more nutrients for the potential growth of mulberry plants which results in the potential cocoons.

Keywords*—Silk worm, Growth, Mulberry plant, Irrigation, Cocoon parameters.

I. INTRODUCTION

Sericulture or silk farming is the rearing of silkworms*Bombyx mori L*for the production of raw silk. Mulberry leaves, particularly those of the white mulberry, are ecologically important as the sole food source of the silkworm (*Bombyx mori*, named after the mulberry genus *Morus*), the pupa/cocoon of which is used to make silk.Silk is a way of life in India. Over thousands of years, it has become an inseparable part of Indian culture and tradition. No ritual is complete without silk being used as a wear in some form or the other. Silk is the undisputed queen of textiles over the centuries. Silk provides much needed work in several developing and labor rich countries. Sericulture is a cottage industry par excellence. It is one of the most labor intensive sectors of the Indian economy combining both agriculture and industry, which provides for means of livelihood to a large section of the population i.e. mulberry cultivator, co-operative rarer, silkworm seed producer, farmer-cum rarer, realer, twister, weaver, hand spinners of silk waste, traders etc. It is the only one cash crop in agriculture sector that gives returns within 30 days. This industry provides employment nearly to three five million people in our country. India is the second largest silk producer in the World after China. Germany is the largest consumer of Indian silk. The sericulture industry is land based as silk worm rearing involves over 700,000 farm families and is concentrated in Karnataka, Tamilnadu and Andhra Pradesh (Southern states of India). Assam and West Bengal states are also involved to certain extent [1].

The silkworm, Bombyx mori L. is a typical monophagous insect and mulberry (Morus spp.) leaf is its sole food.. Sericulture is an age-old land-based practice in India with high employment potential and economic benefits to agrarian families. No doubt, India is the second largest producer of mulberry silk next only to China [2]. Various extracts of medicinal plants have been tested by supplementation in the silkworm Bombyx mori and were seen to influence the body weight, silk gland weight and the silk thread length in Bombyx mori [3] and chitosan solution elicited varied responses in the final instar larvae of *Bombyxmori*[4].Nutrition plays an important role in improving the growth and development of *B. mori[5]*.Fortification of mulberry leaves with the flour of black gram and red gram to improve the larval growth and cocoon characteristics in *B. mori*[6]. The quantity and the quality of dietary protein has long been considered to be important in the growth of the silkworm. Higher growth rate as well as weight gain can be observed in higher protein utilized group and the relative growth rate varied among the different breeds of the silkworm[7] were influenced by the season[8].A strong correlation between the growth of silkworm and the silk production in the silkworm after the treatment with plant extracts and attributed the growth promoting effect of the plant extracts to the stimulation of biochemical processes leading to protein synthesis.[3] The cocoon weight increased when the silkworm larvae were fed with blood meal fortified mulberry leaves [9]. The increased of cocoon weight, when the silkworm larvae were fed with zinc and nickel fortified mulberry leaves [10].Supplementation of tyrosine to enhance the cocoon weight due to the increased synthesis of DNA, RNA and proteins in silk gland.[11] The weight and the size of cocoon shell ratio and fibroin content of the shell increased with the supplementation of the amino acid,

glycine [12] administration of JH analogue, Methaprene, to fifth instar larvae of *B. mori* through hypodermic injection increased the shell weight by 16 percent over the control. Improvement in economic characters of silkworm was also noticed with folic acid administration. Sevarkodiyone has reported a greater stimulatory effect resulting in an increase in shell weight by 30.7 per cent over the control with the supplementation of aqueous leaf extracts of some plants along with mulberry leaves. The silkworm larvae fed on mulberry leaves treated with *Coffeaarabica* leaf extracts at 1:25 concentration recorded significantly higher.

Diluted spentwash increase the uptake of nutrients, height, growth and yield ofleavesvegetables [13, 14] and yields of condiments [15], yields of some root vegetables in untreated and spentwash treated soil [16] yields of top vegetables (creepers) [17] yields of tuber/root medicinal plants [18] yields of leafy medicinal plants[19] yields of leafy medicinal plants in normal and spentwash treated soil [20]. However, no information is available on the yields of cocoon parameters of silkworms CSR-18, CSR-19 and Kolar Gold, reared using M5 mulberry leaves cultivated by irrigation with distillery spentwash. Therefore, the present investigation was carried out to study the influence of M5 mulberry leaves cultivated by irrigating with different proportions of spentwash on the cocoon parameters of silkwormsCSR-18, CSR-19 and Kolar Gold reared using M5 mulberry leaves.

II. MATERIALS AND METHODS

Mulberry plant selected for the present study was M5 variety. The land was ploughed repeatedly (3 to 4 times) to loosen the soil and all gravel, stones and weed were removed to get the fine soil. The ridges and furrows are made at a distance of 1.0 m, sets were planted at a distance of 0.6 m (set to set) along the row and irrigated (by applying 5-10cm^3/cm^2) with raw water (RW), 50% and 33% SW at the dosage of once in fortnight and rest of the period with raw water (depends upon the climatic condition), without the application of any external fertilizer (either organic or inorganic). Harvesting of the leaf is done by plucking individual leaf during cooling hours of the day which is 50-60 days old. These fresh leaves are used to rear silk worms.

Disease free laying of the silkworm were obtained and raised on fresh mulberry leaves as per the new technology for silkworm rearing [21]. After third moult, the larvae were acclimatized to the laboratory conditions by rearing them during the fourth instar in plastic trays of size 26 x 20 x 6 cm. During this period, they were fed four times a day. Sufficient ventilation was ensured to the larvae by placing the trays one above the other crosswise. Coolant gel bags were used to bring down the temperature and wet synthetic foam pads were used to enhance the relative humidity near the larval bed within the optimum level. A Thermo-Hygrometer was used to record the temperature and relative humidity near the larval bed. Fresh and healthy leaves ofM5 variety of mulberry was used in the present study. The leaves were harvested daily from the mulberry garden during the early hours of the day and stored cool to maintain its freshness until use using wet gunny cloth in a wooden chamber. Disinfection was carried out prior to the commencement of silkworm rearing as a precautionary measure against pathogens, which may remain in the rearing room and are likely to infect the silkworm. For this, the rearing room was disinfected by spraying 2% formalin solution 3 days prior to the commencement of rearing. The rearing materials such as trays and mountages were washed with Chloral solution. Dettol solution was used to wash the hands before and after handling the worms during the time of rearing. A bed disinfectant powder prepared by grinding Lime Powder, Paraformaldehyde and Benzoic acid in 97:2:1 ratio was dusted mildly on the worms daily after bed cleaning. Dead larvae if any, during the course of rearing were immediately removed and discarded properly. fed with untreated mulberry leaves. Thus, the larvae in both the control and experimental trays were reared with equal quantities of leaves. The temperature and relative humidity were maintained at about 26 ± 2°C and around 70 ± 10 per cent respectively. Several parameters were studied to assess the growth and the cocoon characteristics of *B. mori*.. The mature larvaeof the experimental sets were isolated and mounted on separate plastic mountage (Netrika). They were left undisturbed for four days to spin the cocoon. The cocoon washarvested. Then cocoons were collected after harvest and cleaned by removing litter. Trials were conducted thrice, cocoon parameters, such as raw Silk percentage, filament length, reelability, denier and shell ratio were determined, recorded by taking the average values. These quantitative parameters were measured by the standard [22].

III. RESULTS AND DISCUSSION

The cocoon parameters were very high reared using M5 variety mulberry plant leaves cultivated by 33% SW irrigation, and moderate in 50%, while comparatively poor in RW (Table-1). In our previous studies also found that 33% SW irrigation favors the growth, yield and nutrients of plants. This could be due to the maximum absorption of NPK by the plants at 33% dilution. In the case of 50% SW irrigation the yields were low.

Enrichment of nutrients in M5 mulberry leaves cultivated by 33% influence healthy growth of silkworms contains comparatively high proportion of natural protein fiber secreted by silkworms in the form a thread, Fibroin – inner core comprising 75% of silk, Sericin - outer gum comprising 25% of silk.

Table-1study of parameters of csr-18, csr-19 and kolar gold cocoons reared with m5 mulberry leaves irrigated by distilleryspentwash.

Cocoon Parameters	CSR-18			CSR-19			Kolar Gold		
	RW	50%PTSW	33%PTSW	RW	50%PTSW	33%PTSW	RW	50%PTSW	33%PTSW
Raw silk (%)	17.10±0.013	18.50±0.012	19.00±0.014	16.50±0.017	17.82±0.007	18.32±0.011	12.5±0.012	13.62±0.015	14.89±0.006
Filament length (m)	760.00±0.007	780.20±0.015	800.00±0.010	755.00±0.006	868.25±0.011	789.34±0.009	742.57±0.006	859.00±0.011	878.34±0.009
Reelability (%)	80.30±0.009	84.20±0.015	86.00±0.007	81.32±0.010	82.40±0.006	85.15±0.013	83.25±0.013	86.15±0.009	88.20±0.013
Denier	2.67±0.012	2.72±0.011	2.98±0.005	2.51±0.015	2.63±0.008	2.76±0.010	2.35±0.009	2.48±0.010	2.56±0.013
Shell ratio	22.00±0.013	22.50±0.009	22.75±0.015	20.90±0.012	21.55±0.009	22.12±0.004	18.88±0.012	19.75±0.013	20.00±0.013

IV. CONCLUSION

It was observed that the parameters of cocoons produced by rearing the silk worms using M5 variety of mulberry leaves cultivated by irrigation in 33% SW were maximum and moderate in 50% SW and minimum in RW irrigations. It concludes that, in 33% SW irrigation the plants are able to absorb maximum amounts of nutrients (NPK) both from the soil and the spentwash resulting high yield and enhance the nutrients in plants leaves which in turn influence the better growth of silk worms containing higher proportion of silk proteins yields spinning of long silk threads in cocoons resulting in increased weight of cocoons, minimizes the cost of cultivation, and increase the parameter values of cocoons resulting in high silk production, this elevates the economy of the farmers, since cultivation of mulberry is made without using fertilizer.

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REFERENCES

[1]. **Ishita Roy**.; Survey report on socio-economic impact of the farmers covered under cluster promotion program (CPP) in Andhra Pradesh, 2012. Retrieved from http://www.seri.ap.gov.in on 03/02/2012.

[2]. **Vijaya Prakash N.B and** Dandin S.B. Yield gaps and constraints in bivoltine cocoon production in Mandya District of Karnataka - An empherical analysis. *Indian J. Seric.* 2005; 44(1):50-54.

[3]. **Murugan K**., JeyabalanD, Senthikumar, N., Senthilnathan S. and Sivaprakasam, N. Growth Promoting effect of plant products on silkworm. ABiotechnological Approach. *Journal of Scientific andIndustrial Research.*1998; *57***:** 740 - 745.

[4]. **Bin Li**, Ting Su, Xiaoling Chen, Baoping Liu, Bo Zhu, YuanFang, Wen Qiu and GuanlinXie.. Effect of chitosan solution on the bacterial septicemia diseaseof *Bombyxmori* (Lepidoptera: Bombycidae) causedby*Serratiamarcescens.*" *Applied Entomology andZoology.* 2010; *45*: 145 - 152.

[5]. **Kanafi, R.R**., Ebadi, R., Mirhosseini, S.Z., Seidavi, A.R., Zolfaghari, M. and Eteban, K. A Review on nutritive effect of mulberry leaves enrichment withvitamins on economic traits and biological parametersofsilkworm, *Bombyxmori*L. *Indian Sericulture Journal.* 2007; *4*: 86 - 91.

[6]. **Alagumalai, K**., Hepshyba,C.S.S.and Ramaraj, P.Bran of pulses as extra nutrient to Silkworm. *IndiaSilk.*1991; 30(6): 10-13

[7]. **Magadum, S.B**., Hooli, M.A. and Magadum, V.B. Effect of the application of Juvenile hormone analogue in V instar followed by thyroxin in the Pure MysoreBreed of *Bombyxmori*. L. *Sericologia.*1996*;* 32 (3):385 - 390.

[8]. **Isaiarasu, L**. and Suriabraman, S. Seasonaldifferences in the biochemical composition of M5 and MR2varieties grown in Sivakasi and their influence on the growth of the late age larvae of *Bombyxmori*.*Journal ofEcobiology.*1999;11 (3): 229 - 231.

[9]. **Matsura, Y**. Utilization of blood meal as the source of dietary protein for the silkworm, *Bombyx mori*.L. *Japan Agriculture Research Quarterly*.1994;28 (2):133 - 137.

[10]. **Chamudeswari, P**. and Radhakrishnaiah, K. Effectof Zinc and Nickel on the silkworm.*Bombyxmori*L.*Sericologia*. 1994;34 (2): 327 - 332.
[11]. **Majumdar A.C**. and Medda, A.K. Studies on thethyroxin and vitamin B2 induced changes in the cycle of Silkworm *Bombyxmori. Indian Journal of Physiology and Applied Science*. 1995; 29: 1 - 13.
[12]. **Isaiarasu, L**. and Ganga, G. Influence of dietaryglycine supplementation on the mulberry silkworm, *Bombyxmori.ANJAC Journal*.2000;17: 47 - 53.
[13]. **Chandraju S**, Basavaraju H.C. Impact of distillery spent wash on Seed germination and Growth of leaves Vegetables: An investigation. *Sugar Journal (SISSTA*). 2007; 38: 20-50.
[14]. .**Basavaraju H.C**, Chandraju S. Impact of distillery spent wash on the Nutrients of Leaves vegetables: AnInvestigation.*Asian J. of Chem*. 2008;20 (7):5301- 5310.
[15]. **Chidan Kumar C.S**, Chandraju S. Impact of distillery spentwash Irrigation on the yields of some condiments: An investigation. *Sugar Tech*.2009; 11(3): 303-306.
[16]. **Chidan Kumar C.S**, Chandraju S, NagendraSwamy R.Impact of distillery spentwash Irrigation on the yields of some root vegetables in untreated and spentwash treated soil. *SISSTA*, 2009. 40:233-236.
[17]. **NagendraSwamy R**, Chandraju S, GirijaNagendraswamy and Chidan Kumar C.S. Studies on the impact of irrigation of distillery spentwash on the yields of tuber/root medicinal plants. *Biomedical Pharmacology J*.2010; 3(2): 99-105.
[18]. **Chidan Kumar C.S**, Chandraju S, NagendraSwamy R. Impact of distillery spentwash irrigation on yields of top vegetables (creepers). *World Appl. Sci. J*.2009 6(9): 1270-1273.
[19]. **NagendraSwamy R**, Chandraju S, GirijaNagendraswamy and Chidan Kumar, C.S Studies on the impact of irrigation of distillery spentwash on the yields of leafy medicinal plants. *Nat. Env. Poll.Tech*. 2010; 9(4): 743-748.
[20]. **Chandraju S**, NagendraSwamy R, Chidan Kumar C.S and GirijaNagendraswamy.Influence of Distillery spentwash irrigation on the yields leafy medicinal plants in normal and spentwash treated soil. *Internat. J. agric.Sci*. 2010; 7 (1): 23-26.
[21]. **Dandin, S.B**., Jayaswal, J. and Giridhar, K. Handbook of Sericulture Technologies, Central Silk Board, Bangalore. 2000. pp. 259.
[22]. **Sonwalker TN**. Hand book of Silk Technology, Wiley Eastern Limited, New Delhi, 1993 pp.14-25.