

Nutritional Efficiency and Economic Traits in *Samiaricinidonovan* Reared On Castorleaves Fortified with Probiotic Agent

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ABSTRACT: The silkworm larvae were fed on *ricinuscommunis* leaves treated with 0.5%,1%,1.5%,2%,2.5%,3% concentrations of probiotic Darolac from 3rd instar onwards and its effect on food consumption,utilization and economic traits was studied to understand the efficiency of conversions and its potentials to increase the silk yield in eri silkworm. *Ricinuscommunis* leaves treated with probiotics recorded maximum food assimilation,assimilation rate food conversion rate at 2% concentration while various economic parameter like weight(7.96gms/10 worms) pupal weight(4.06gms), cocoon weight(4.61)and shell weight (0.57) silk ratio % (12.17) and ERR% (95) also showed increase when compared with control treated batch.The probiotic(darolac) treatment showed the increase in parameters such as growth,development as well as commercial qualities of cocoon at 2% concentration.

KEY WORDS: *Ricinuscommunis*,probiotic, eri silkworm, conversion rate, darolac

I. INTRODUCTION

Qualitative and quantitative increase of silk production would results into better economics in silk industry.In order to maximize silk production,information on nutritional ecology is a requisite for better knowledge of insectsethobiology& physiology[1]

Nutritional quality of castor leaves influences ingesta which is related to the physiology of digestion which subsequently influences the growth and development of eri silkworm and its commercial characters. Enrichment of feeds with adequate amount of probiotics confer health benefits to insects by maintaining or improving their intestinal flora. This process is called direct fed microbial method. Nutritional supplements include vitamins, amino acids, protiens and probioticswhen added to larval feed tend to increase nutritional efficiency and economic traits of silkworm[2][3][4].

Probiotics are living, health promoting microorganisms which beneficially effect the host by improving the microbial balance [5].Commonly claimed benefits of probiotics include the decrease of potentially pathogenic gastrointestinal microorganism,strengthening of the immune system and the protection of proteins and lipids from oxidative damage. Different species of lactic acid as probiotics has been extensively tried on mulberry silkworm to improve the commercial characters [6]. As there is no information on the effect of commercial probiotics on eri silkworm, an attempt has been made to find out the effect of Darolac(probiotic) on eri silkworm growth, nutritional efficiency and economic traits

II. MATERIAL AND METHODS

Test insect

The diseased free eggs of eri silkworm were procured from Shadnagar (Hyderabad),Telangana.Eri silkworm was selected for the experimental studies because of their hardness and resistant nature was cultivated under irrigated conditions. A total of two rearings were conducted following recommended package of practices [6]. The larvae were reared up to 3rd instar and worms were treated from 3rd instar till maturity.

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Darolac ('Aristo' Mumbai) is a commercial probiotic having four strains such as *L.acidophilus*, *L.rhaminosus*, *B.longum* and *S.bouardii*. Seven different concentrations were made with three replications and 200 larvae per replication in rearing house under controlled (Temp 25-26C) and relative humidity (85%) conditions were maintained.

The healthy larvae were counted daily in each treatment of three replications and unhealthy /weak larvae if any were replaced by healthy ones of the same age. Feed utilization studies were recorded in late age Eri silkworms which consumed maximum leaves. Aqueous solution of darolac 0.5%, 1%, 1.5%, 2%, 2.5% and 3% concentration and control with distilled water were prepared for fortification. The nutritional efficiency and economic traits were recorded and experimental results obtained were evaluated by analysis of variance at 1% and 5% level of significance.

III. RESULTS AND DISCUSSIONS

The effect of darolac fortified castor leaves fed to eri silkworms on nutritional efficiency and commercial characters are given in Table 1, Table 2 and Table 3. High larval weight 85 gms/10 larvae at 2% concentration was recorded while the amount of ingesta and digesta varied significantly in 4th and 5th instar eri silkworms with different concentrations

Table -1 Food intake and utilization budget of *S. ricini* during 5th Instar larvae fed on castor leaves fortified with probiotic, darolac

TREATMENT	INGESTA	DIGESTA	AD	RR	ECI	ECD	RCR	RGR
T1	451.03	229.8	51.23	1.5	34.7	50.48	0.75	0.07
T2	462.23	249.30	55.02	1.8	36.4	51.36	0.88	0.12
T3	473.17	265.10	56.17	2.01	38.9	52.41	1.01	0.35
T4	485.36	280.36	57.78	2.29	40.04	53.75	1.32	0.42
T5	468.71	271.16	55.6	2.05	37.41	52.25	0.99	0.23
T6	452.26	259.6	56.5	1.86	35.30	50.3	0.52	0.015
CONTROL	411.13	207.13	50.55	1.15	33.21	49.7	0.32	0.015
CD AT 5%	5.24	63.24	15.84	0.25	15.71	26.16	4.75	0.88
CD AT 1%	8.32	70.15	19.25	0.83	21.20	33.24	6.35	2.88

AD=Approximate digestibility ECI=Efficiency of converting the ingesta ECD=Efficiency of converting the digesta
RCR= Relative consumption rate RGR=Relative growth rate RR=Reference ratio

The amount of ingesta (485.36 gms) and digesta (280.36 gms) was maximum in castor leaves treated with darolac. Gradual increase in nutritional efficiency values was observed from T1 to T4 treatments while from T5 to T6 there was declination in the values whereas in the control the values were comparatively low when compared to other treatments. Increase in ingesta, digesta, approximate digestibility, reference ratio, ECI, ECD, RCR and RGR with advancement of age is a well known fact. The higher nutritional efficiency values are necessary as the larvae has to maintain metabolic demand during metamorphosis. Similar results were reported by [7][8] in Eri silkworm. An overall analysis of all seven treatments showed significant changes in nutritional efficiency values in all seven concentrations when compared to that of control batch. The maximum approximate digestibility indicate the greater suitability of the feed. In T1-T4 the approximate digestibility and rate of assimilation are comparatively more than T5 and T6 treatments, this is due to superior quality and moisture content in the eri silk worm feed which directly influences phagostimulation, digestion and conversion efficiency values significant differences in ECI among the seven concentration batches is also observed and maximum efficiency of conversion of ingested food is an overall measure of utilization ability of ingested food by eri silkworm

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Table-2 Conversion efficiency parameters to cocoon and shell

TREATMENT	ECI TO COCOON	ECD TO COCOON	ECI TO SHELL	ECD TO SHELL
T1	7.40	12.08	1.03	1.65
T2	7.56	12.85	1.07	1.70
T3	7.79	13.91	1.08	1.95
T4	7.96	14.86	1.13	2.04
T5	7.89	13.96	1.09	1.96
T6	7.75	13.85	1.04	1.88
CONTROL	6.44	11.46	0.98	1.76
CD AT 5%	2.35	3.85	0.14	1.13
CD AT 1%	3.21	5.18	1.05	3.18

Impact of feed supplement darolac on economic traits are summarized in Table 2. Present investigation revealed significant increase of cocoon weight (4.61 gms) from T1-T4 treated batches when compared with control, while from T5-T6 there was a gradual decrease in the same parameters. The data pertaining to mean shell weight (0.57gms) was highly significant at 2%(T4) followed by T3,T2 and T1 batches. Probiotics utilize simple carbohydrates like glucose, fructose which are necessary for eri silkworm growth, development and also includes the storage proteins which is reflected in sericin and fibroin content. The commercial character values are in accordance with the findings of [9]. Based on the results it can be concluded that fortification of feed of eri silk worm with darolac have a positive impact on the economic traits of eri silkworm at certain level.

Table -3 Effect of Darolac on commercial characters

TREATMENT	COCOON WEIGHT	SHELL WEIGHT	PUPAL WEIGHT	ERR	SR%
T1	4.39	0.59	3.8	86	13.46
T2	4.47	0.67	3.8	88	14.96
T3	4.55	0.65	3.9	90	14.28
T4	4.61	0.57	4.04	95	12.17
T5	4.53	0.63	3.9	93	13.90
T6	4.50	0.60	3.9	91	13.33
CONTROL	3.99	0.59	3.4	85	14.78
CD AT 5%	1.36	0.08	1.09	23	3.91
CD AT 1%	3.45	1.38	3.12	42	6.23

ERR=Effective rate of rearing

SR=Silk ratio

IV. CONCLUSION

In conclusion, silkworm diet supplementation with commercial probiotic, darolac at certain levels may be effective to improve growth, development and economic traits. However the mechanism of interaction of host native microbiota with commercial probiotic strains on food assimilation physiology and innate immunity of silk worm require further investigation.

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