I.J.S.N., VOL.6 (3) 2015: 488-490 ISSN 2229 – 6441

INTERNATIONAL JOURNAL OF SCIENCE AND NATURE

www.scienceandnature.org

ASSOCIATION ANALYSIS OF MAJOR NUTRIENT AND SECONDARY NUTRIENT STATUS OF LEAVES OF SELECTED CASTOR GENOTYPES AND GROWTH INDICES OF ERI SILKWORM

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ABSTRACT
The foliar constituents of castor genotypes *viz*., major and secondary nutrients had marginal influence on growth indices showing positive trend with respect to improvement in the performance of eri silkworm. Major nutrient like nitrogen and secondary nutrient like calcium had significant relationship with growth indices, while the growth indices were non-significant with other major (phosphorus and potassium) and secondary nutrients (magnesium and sulphur). The growth indices *viz*., silk index (r = 0.7707), oviposition index (r = 0.7263), leaf – silk conversion rate (r = 0.7096), growth index by percent pupation (r = 0.7281) and net reproductive rate (r = 0.7386) with nitrogen content of castor leaves showed significant positive relationship among them. Further, calcium content was found to have significantly positive correlation with larval weight index (r = 0.8969), cocoon weight index (r = 0.9548), silk index (r = 0.9688), eclosion index (r = 0.8936), oviposition index (r = 0.9425), leaf-cocoon ratio (r = 0.8408), leaf - egg ratio (r = 0.8672), leaf – cocoon conversion rate (r = 0.8521), leaf – silk conversion rate (r = 0.9323), growth index by per cent pupation (r = 0.9815), growth index by per cent moth emergence (r = 0.9609) and net reproductive rate (r = 0.9492), while the trend was reverse with larval duration index (r = -0.9405), pupal duration index (r = -0.9293) and larval -pupal duration index (r = -0.9579). The foliar constituents of castor genotypes *viz*., bio-chemical, major and secondary nutrient had marginal influence on bio-energetic and economic traits and growth indices showing positive trend with respect to improvement in the performance of eri silkworm.

KEY WORDS: oviposition index, eclosion, castor genotypes, reproductive rate, moth emergence.

INTRODUCTION

The superiority of silk as a textile fiber has been recognized from time immemorial. Lustrous silk, luster feel, and luster of silk fabric are unquestionably inimitable. Apart from the marvelous mulberry silk, which is quite popular the worldover, there are few other varieties that are equally attractive. They are collectively termed as '*Vanya Silks*' comprises of Tasar, Eri and Muga silks. Among wild silks, eri silk accounts for 78.4%. Ericulture is mainly confined to North - Eastern region of India. In India, ericulture has got great potentiality since the castor leaves are available abundantly in nature and among different host plants, castor is the primary host plant of eri silkworm and castor also plays an important role in oilseed production in the country. In addition to the factors like abundant availability of nature grown food plants, multivoltine nature of silkworm, low cost of rearing, assured crop and simple traditional spinning devices have encouraged rearers to take up ericulture as a commercial proposition. Apart from this, it supplements various valuable byproducts, which help significantly in boosting the economy of poor rearers. Better the quality of leaves, greater would be the chances of getting the good cocoon harvest. Castor is rich in varietal composition and many local and high yielding varieties / hybrids are widely grown in Assam and other parts of the country. The selection of castor genotypes is an important factor for better growth and development of eri silkworm for higher productivity in terms of cocoon yield. It has also been noticed that the silk ratio varies with the type of host and eri silkworm breed used for rearing (Dookia, 1980).The food quality relevant to all aspects of insect performance including growth, development and reproductive potentiality depends mainly on nutritional composition, which includes both the absolute and relative amount of water, carbohydrates, proteins, amino acids, lipids, fatty acids, vitamins, minerals, etc. (Slansky and Scriber, 1985). The process of consumption, digestion and conversion efficiency in its broadest sense underline and link the physiological, behavioral, ecological and evolutionary aspects of insect life (Slansky and Scriber, 1985). There is a tremendous scope for ericulture in castor growing areas without affecting castor seed production which it provides additional returns for the poor, dry land cultivators and small and marginal farmers (Krishna Rao, 2003). Castor, a minor oilseed crop can be linked with ericulture to maximize the returns if right choice of the genotype of castor is made (Misra, 1987).

MATERIALS & METHODS

The methods followed and materials used in the study are presented hereunder. The major and secondary nutrients were extracted and calculated on dry weight basis (Jackson, 1973).

In the digested extract, calcium and magnesium were determined by titrating the aliquot against standard

E.D.T.A. solution using suitable indicators as described by Jackson (1973) and the contents were expressed in percentage on oven dry weight basis.

Statistical Analysis of Data

The data in percentage were subjected to angular transformation (Snedecor and Cochran, 1979).

Data recorded on castor and eri silkworm were analysed statistically (one-way RCBD and CRD, respectively) for test of significance using Fisher's method of "Analysis of variance" as outlined by Sundarraj*et al*. (1972). The level of significance of 'F-test' was tested at 5 per cent.

Correlation Studies

In order to know the relationship between the foliar constituents of castor genotypes with growth indices both on fresh and dry weight basis and calculated as per Waldbauer (1968).The correlation co-efficients were worked out at P=0.05 as per the procedure outlined by Snedecor and Cochran (1979).

RESULTS & DISCUSSION

Major nutrient like nitrogen and secondary nutrient like calcium had significant relationship with growth indices, while the growth indices were non-significant with other major (phosphorus and potassium) and secondary nutrients (magnesium and sulphur). The growth indices *viz*., silk index (r = 0.7707), oviposition index (r = 0.7263), leaf – silk conversion rate (r = 0.7096), growth index by per cent pupation (r = 0.7281) and net reproductive rate (r = 0.7386) with nitrogen content of castor leaves showed significant positive relationship among them (Table 1).

TABLE 1: Correlation co-efficient of major nutrient status in leaves of selected castor genotypes and growth indices of eri silkworm

Source		Major Nutrients		
		Nitrogen	Phosphorus	Potassium
Larval weight index		0.6562	0.3641	0.2182
Larval duration index		-0.7030	-0.2606	-0.1662
Pupal weight index		0.2223	0.0642	0.1132
Pupal duration index		-0.5321	-0.1105	-0.0199
Larval – Pupal duration index		-0.6444	-0.2007	-0.1057
Cocoon weight index		0.6820	0.3570	0.2339
Silk index		0.7707*	0.4296	0.2742
Eclosion index		0.4675	0.1835	0.0866
Oviposition index		0.7263*	0.2930	0.1345
Hatching index		0.0527	0.5209	0.5660
Leaf – Cocoon ratio		-0.5874	-0.1404	0.1025
Leaf – Egg ratio		0.6470	0.1802	-0.0487
Leaf – Cocoon conversion rate		0.5990	0.1845	-0.0476
Leaf – Silk conversion rate		0.7096*	0.3038	0.0942
Growth index:	% Pupation	0.7281*	0.3171	0.2028
	% Moth emergence	0.6231	0.2092	0.1102
Net reproductive rate		0.7386*	0.3467	0.1988

* Significant at P = 0.05

TABLE 2: Correlation co-efficients of secondary nutrient status in leaves of selected castor genotypes and growth indices of eri silkworm

Source		Secondary Nutrients		
		Calcium	Magnesium	Sulphur
Larval weight index		0.8969*	-0.2964	0.4995
Larval duration index		-0.9405*	-0.0258	-0.3388
Pupal weight index		0.4610	-0.2148	0.1826
Pupal duration index		-0.9293*	-0.0415	-0.2902
Larval – Pupal duration index		-0.9579*	-0.0334	-0.3255
Cocoon weight index		0.9548*	-0.2356	0.4852
Silk index		0.9688*	-0.2333	0.5274
Eclosion index		0.8936*	-0.0155	0.3683
Oviposition index		0.9425*	-0.1553	0.4131
Hatching index		0.0772	-0.7906	0.4597
Leaf – Cocoon ratio		0.8408*	0.0536	-0.3627
Leaf – Egg ratio		0.8672*	-0.0765	0.3536
Leaf – Cocoon conversion rate		0.8521*	-0.0996	0.3828
Leaf – Silk conversion rate		0.9323*	-0.1684	0.4616
Growth index:	% Pupation	0.9815*	-0.0864	0.4222
	% Moth emergence	0.9609*	-0.0024	0.3465
Net reproductive rate		0.9492*	-0.1992	0.4473

* Significant at P = 0.05

Further, calcium content was found to have significantly positive correlation with larval weight index (r = 0.8969), cocoon weight index (r = 0.9548), silk index (r = 0.9688), eclosion index (r = 0.8936), oviposition index (r = 0.9425), leaf-cocoon ratio (r = 0.8408), leaf - egg ratio (r = 0.8672), leaf – cocoon conversion rate (r = 0.8521), leaf – silk conversion rate (r = 0.9323), growth index by percent pupation (r =0.9815), growth index by percent moth emergence (r =0.9609) and net reproductive rate (r = 0.9492), while the trend was reverse with larval duration index (r = -0.9405), pupal duration index (r = -0.9293) and larval -pupal duration index (r = -0.9579). Calcium content of castor genotypes was found to have significant positive relationship with leaf –cocoon ratio (r = 0.8408) and leaf – egg ratio (r = 0.8672) (Table 2). Basaiah (1988) recorded lower leaf - cocoon ratio with Local castor genotypes. Further, Reddy and Narayanaswamy (1999) and Sannappa *et al*. (2000a) have also recorded variation in leaf-cocoon and egg ratio among the castor genotypes Foliar calcium content had significant positive relationship with leaf – cocoon conversion rate (r = 0.8521), while leaf –silk conversion rate was significantly and positively correlated with nitrogen (r = 0.7096) and calcium (r = 0.9323). Jayaramaiah and Sannappa (2002) and Chandrappa (2003) observed variation in leaf - cocoon and silk conversion rate of eri silkworm on different castor genotypes. Foliar nitrogen and calcium contents showed significant positive relationship with growth index (% pupation) (r = 0.7281 and 0.9815) and NRR (r = 0.7386 and 0.9492), while growth index (% moth emergence) had the same with calcium (r = 0.9609). Similarly, Reddy *et al*. (1989) and Sannappa *et al*. (2000b) also observed variations in growth index and net reproductive rate on castor genotypes. Chandrappa (2003) observed that NRR was more with DCS-85 genotype (150.79) followed by Local (150.03) and 48-1 genotype (148.34).

REFERENCES

Basaiah, J.M.M. (1988) Consumption and utilization of castor and tapioca by the eri silkworm. M.Sc. (Seri.) Thesis, UAS, Bangalore, p. 119.CHANDRAPPA, D., 2003, Performance of eri silkworm on some castor genotypes and economics of ericulture – cum – castor seed production. Ph.D. Thesis, UAS, Bangalore, p. 146.

Dookia, B.R. (1980) Varied silk ratio in cocoons of eri silkworm (*Philosamiaricini* Hutt.) reared on different castor varieties in Rajasthan. *Indian J. Seric.*, 19: 38-40.

Jackson, M. L. (1973) *Soil Chemical Analysis.* Prentice Hall (India) Pvt. Ltd., New Delhi, p. 260.

Snedecor, W. G. & Cochran, G. W. (1979) *Statistical Methods Applied to Experiments in Agriculture and Biology.* Allied Pacific Pvt. Ltd., Bombay, p. 534.

Sundarraj, N., Nagaraju, S., Venkataramu, M. N. & Jagannath, M. K. (1972) *Design and Analysis of Field Experiments.* Directorate of Research, UAS, Bangalore, p. 419.

Slansky, F. & Scriber, J.M. (1985) Food consumption and utilization. In: *Comprehensive Insect Physiology, Biochemistry and Pharmacology.* Vol. 4, Eds. G.A. Kerkut and L.I. Gilbert, pp. 88-151.

Misra, S.D. (1987) Viability of ericulture and economics. *Sericologia*, 27: 237-242.

Krishna Rao, J.V. (2003) Large scale development of ericulture in India. *Indian Silk*, 42(1): 27-29.