A CONCLUDED RESEARCH PROGRAMME REPORT

Project code and Title:

B-JRH (P)-040 : Studies on Mulberry Germplasm in Agro-climatic conditions in North Eastern States

(April, 2015- August,17)

Submitted by

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Central Silk Board

Ministry of Textiles: Govt. of India

RSRS, Rowriah-785685 ,Jorhat, Assam

Pro-forma / instruction for Submission of Concluded Research Project/Programme

i. **Programme code and title: (B-JRH (P) 040): Studies on Mulberry Germplasm in Agro-climatic conditions in North Eastern States.**

ii. **Names of the project investigators (including coordinator in case of collaborative project)**

Investigators:

(1) Smt. M. Pamehgam, Sc.-C, RSRS, CSB,Jorhat, Assam P-I

(2) Dr. S.N. Gogoi, Scientist-D, RSRS,CSB, Jorhat, Assam Co- PI

Coordinators:

(1) Dr. KanikaTrivedy, Director, CSR&TI, Berhampore, West Bengal

iii. Duration

April, 2015 – Aug, 2017 (2.5 years)

iv. Names of the institutes and address

Regional Sericultural Research Station (RSRS), Jamuguri, Rowriah, Jorhat-785005, Assam

v. Objectives

a. To established mulberry field gene bank with the collections from north –eastern region.

b. To identify a promising mulberry accession for commercial utilization.

vi. Introduction

Mulberry (*Morusindica* L.) is a deep rooted foliage crop, which is cultivated widely in Assam for rearing silkworm (*Bombyxmori* L.). The quality of silk largely depends on the quality of mulberry leaf on which the silkworm feeds. The fertility status of soil on which the mulberry is grown affects the yield and quality of leaf, which reflects on the quality of silk produced. Hence, assessing and monitoring fertility status of soils under mulberry cultivation are of much importance with respect to the production of good quality silk. The importance of essential nutrient elements on the quality of both the mulberry leaf and silkworm cocoon has been studied by various researchers (Shankar and Rangaswamy, 1999; Lu *et al.*, 2004; Chen *et al.*,

2009).Assessing available statusof these nutrient elements in mulberry growing soils is necessary for ensuring their proper supply to the crop. Systematic assessment of fertility status of mulberry growing soils has hardly been carried out in India (Bongale and Lingaiah, 1998; Samanta*et al.*, 2002).North Eastern Region of the country is also not exceptional in this regard. It is pertinent to mention that systematic assessment of nutritional status of mulberry growing soils is of tremendous importance in the identification of priority areas that need proper management practices for production of high quality leaf in order to produce high quality silk.

vii. Methodology adopted :

Work plan: The project is having 3 (three) experiments :-

The following methods were followed

Maintenance of Mulberry garden: Twenty three accessions *i.e.* **MI-0884, MI-0354, MI-0395, MI-0807, MI-0151, MI-0359, MI-0879, MI-0875, MI-0342, MI-0106, MI-0344, MI-0358, MI-0357, MI-0355, MI-0349, MI-0845, MI-0844, MI-0255, MI-0356, MI-0877 MI-0346, MI-0873 and MI-0090** were collected from CSGRC, Hosur and planted in 6 x 6 ft spacing and 3 numbers of plants in each row with 3 replications in field gene bank . Three plants were considered one replication and standard packages and practices was followed for **maintenance of field gene bank** at RSRS, Jorhat, Assam.

Height of pruning: 5 feet.

1. **Pruning schedule**: 2 times.

Pruning Schedule	Height of pruning
30th November	150 cm
June	140cm

2. **Nutrition management**: Recommended package of practices for rain-fed conditions.
3. **Irrigation schedule**: As per need.

The experiments (3) was studied :

E01: Study of growth and yield parameters of the mulberry genetic resources.

Parameters studied: Leaf yield (g/plant), shoot yield (g/plant), moisture content (%), Moisture retention capacity (%), leaf length, leaf breadth, petiole length, longest shoot length, etc.

E02: Study of disease incidence of the mulberry genetic resources.

Parameters studied: Leaf Spot, Leaf rust and Powdery mildew in 3 different season's *i.e.* (a) Spring (b) Autumn and (c) Summer and rainy season

Parameters studied: Population of thrips, Population of white fly and mealy bug (tukra)

E03: Studies the palatability of mulberry silkworms on mulberry genetic resources.

Parameters studied: Rearing will be conducted in two season's i.e. spring (March-April) and autumn (Sept.-Oct.) with ruling commercial hybrid. Data will be record on (1) larval weight (g) (2) larval duration (days) (3) moulting period (hrs) (4) cocoon weight (g) (5) cocoon shell weight (g) (6) SR % (7) Yield per 100 dfls (8) Fecundity (9) Hatching(%) .

viii. Results : Inference/ recommendations

Growth and Leaf yield : Studied the growth and yield attributing characters of 23 mulberry accessions*viz.* MI-0884, MI-0354 MI-0395, MI-0807, MI-0151, MI-0359, MI-0879 , MI-0875 , MI-0342, MI-0106, MI-0344 , MI-0358, MI-0357 , MI-0355, MI-0349 , MI-0845, MI-0844 , MI-0255, MI-0356, MI-0877, MI-0346, MI-0873 and MI-0090 at RSRS, Jorhat.

The leaf yield data of MI-0349 (12.272 t/ha/yr) and MI-884 (10.956 t) was significantly higher among the accessions followed by MI-0354 (9.152t) and low was recorded in MI-0359(5.232 t). Maximum leaf shoot ratio was recorded in MI-035(1.87) and low in MI-0875 (0.49). Among the accessions longest shoot length was recorded in MI-0884 (280cm) followed by MI-0807 (215 cm) and low was recorded in MI-0356 (102 cm).

The intermodal distance was recorded high in MI-0355 (6.2 cm) followed by MI-0354 (5.5 cm) and low was recorded in MI-877, MI-875, MI-342, MI-344, MI-358 (2.0 cm) respectively.

Leaf length and leaf wide data was recorded in the study, the maximum leaf length was recorded in MI-0356 & MI-0884 (26 cm in length) followed by MI -0844(23 cm in length) and low was in MI-0356 (11 cm in length) .Likewise, leaf wide data was recorded high (16 cm) in MI-0356,MI-0844, MI-0349, MI-0357, MI-0884 followed by MI-0355,MI-0359, MI-0877 (15 cm) and low in MI-0845, MI-0875, MI-0151 (9.0 cm).

Thus,the petiole length was recorded high in MI-0844 (5.0 cm) and low was recorded in MI-0356 (2.0 cm) in the study.

Maximum moisture content was observed in MI-0875 (74.38 %) followed by MI-0358 (73.33 %) and low was recorded in MI-0844 (68.18%). The moisture retention (MRC%) capacity of the accession was high in MI-0359 (71.21%) & MI-0358 (70.25%) and low in MI-0354 (46.52%) respectively .

Observation of pest and diseases: Leaf rust was recorded high in acc. No. MI-0354 (0.7 PDI) and low was recorded in MI-0884 (0.5 PDI). Thrips and mealy bugs was recorded high in acc. No.MI-0807 (2/shoot) and MI-0844 (5 no/sh) respcctively.

Testing of silkworm palatability in Mulberry accessions: The Silkworm palatability was tested on 23 mulberry accessions during commercial crop seasons with silkworm breed B.con 1 x B. Con 4. Economic traits of cocoon yield were recorded in each accession and shows highest in Accession no. **MI-0349** yield per100 dfls (60.36 kg) , single cocoon wt. (1.73 g), single shell wt (0.315 g) , SR% (18.11%) , ERR by no. (8748), ERR by wt. (15309 g) , yield / 100 dfls (61.24 kg) followed by **MI-0807** single cocoon wt.(1.71g), single shell wt (0.310 g) , SR% (18.10%) , ERR by no. (8852), ERR by wt. (15090 g) , whereas low yield was recorded in Acc. No. MI-0357, Garbandha-1 (44.67 kg/ 100 dfls.).

During rearing larval duration (23 days), moulting hrs (21-24 hours), larval weight (2.60-3.28 gm), Fecundity, (419-444 no) and hatching (86 %) were recorded.

Result / Inference/ Recommendations:

The analysed data shows that, leaf yield (12.272 t/ha/yr) and cocoon yields (61.24 kg) data was higher in MI-0349 (Garbandha-2) among the 23 accessions and this accession may be recommend for further multiplication.

Suggested plan of action for utilization of the expected outcome from the programme:

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Suggested plan of action for utilization of the expected outcome from the programme:

The accession MI-0349 may be multiplied for further testing in fields.

ix. Application made for patenting/ commercialization if any : Nil

x. References

- Gogoi, S.N. and *Basera, C. (2010) Vegetative phenophages of *MORUS MACROURA* MIQ. and its comparison with improved mulberry varieties in Nagaland*Bull. Ind. Acad. Seri.***14** (2)46-55
- Hooker, J.D. (1885) The Flora of British India Vol. V. William Clowes and Sons Ltd., London, England, pp. 155-180.
- Kanjilal, U.N., Kanjilal. P.C. and Das, R N (1984) Flora of Assam. Vol. IV Reprinted by Periodical Expert Book Agency, D-42, VivekVihar, New Delhi, India, pp. 66-67.
- Thangavalu , K., Mukherjee, P., Tikader, A., Goel, A.K., Rao, A, Anands , Naik, V. Girish, Sekar, (1997) Catalague on mulberry (Morus spp.) germplasm . Central SericulturalGermplasm Resources Centre, Hosur, Vol : 2 p17-18
- Thangavalu , K., Tikader, A., Ramesh, S.R. Rao, A, Anands , Naik, V. Girish, Sekar, S., Deole, L.Ashok (2000) Catalague on mulberry (Morus spp.) germplasm . Central SericulturalGermplasm Resources Centre, Hosur, VolI : 2 p17-18

xi. Papers published : NA

xii. Summary

Mulberry genetic diversity is recognized as a basic key component for sustainable sericulture development. The need of diversity is continuous because of fast changing of environment in recent past. Indigenous mulberry land races *i. e.*, Assam Bola, Assam Tai, Jatinuni, Koliakotahi, Mowlai Satin, Shillong wild, Nagaland wild, Tripura local and Manipur local are found in different states of North Eastern region and being used in silkworm rearing. These accessions are acclimated to this climatic conditions and show late defoliation during autumn than improve

varieties. These mulberry varieties are maintained as tree s for silkworm rearing than bush plantation. Some genotype like *KoliaKotahi* is resistance to powdery mildew. Assam bola is resistance to pest and leaf spot diseases and produce maximum leaf yield during drought conditions in Assam. The Satin is higher leaf yielder, resistance to pest and leaf spot diseases and develop with Jhum cultivation in Meghalaya.

The mulberry *ex situ* field gene bank at CSGRC converses 1269 mulberry accessions(999 indigenous and 270 exotic) collected from diverse genetic and geographical regions of India. Out of this 90 local land races and wild mulberry genetic resources belongs to 3 *Morus* species (M. *indica,* M. *Alba* and M. *Laevigata*) which are exclusively collected from north-eastern region of India. CSGRC, Hosur systematically characterized and evaluated the mulberry accessions maintained in the ex situ field gene bank and trait specific promising accessions have been identified for utilization.

xiii..Budget utilized etc. (duly authenticated by the project investigators, project coordinator in case of collaborative projects and the Head of the institute)

Budget utilization certificate shall be provided separately.

(a) Utilization of budget (laksh) under RSRS, Jorhat, Assam =Rs. 1.40

© Total budget utilized =Rs. 1.40

Duly authenticated by the Project Investigators, project coordinator in case of collaborative project and the Head of the Institute

1. **Dr. S.N.Gogoi, Scientist –D**

RSRS, Jorhat, Assam

Signature of Co- Investigator

वैज्ञानिक-डी Scientist - D

क्षे.रे.अ.के,जोरहाट RSRS, Jorhat

2. **Smt. M. Pamehgam, Scientist-C**

RSRS,,Jorhat, Assam

Signature of Principal Investigator

वैज्ञानिक-सी/Scientist-C

क्षे.रे.अ.के./RSRS

जोरहाट/Jorhat

4/11/17

3. Signature of Director / Project Coordinator

1/12/17

4. Signature of Director/ Project Co-coordinator

Central Sericultural Research & Training Institute, Berhampore 742101

(Applicable for inter-institutional ofInstitute with seal and date)

Directors comments :- It is a Institute coded programme has been concluded as per the milestone (from April. 2015 to Aug. 2017) successfully. In this concluded report observed that 23 accessions were maintained in their field gene bank by taking timely desired data. However, it should be continued as Routine programme for maintaining those accessions of their region for developt. of mul. varieties. Thus, it is concluded as per the time schedule but this programme is being continued in organized for as gene bank of mul.