

List of Concluded Research Projects 2015-16 (as on 1st September, 2016)

#	Title	Start	Closure	Objectives	Findings	Future course of Action
1	<p>PIG-3502: Sustaining mulberry yields: Identification of QTLs conferring resistance to root rot disease by Linkage Disequilibrium mapping and trait introgression (Phase I) ó (DBT funded)</p> <p>Dr. V. Girish Naik and Dr. V. Nishitha Naik</p> <p>Rs. 23.22 lakhs (21.10 lakhs)</p>	Jun 2013	Mar 2016	<ol style="list-style-type: none"> 1. Resistance response of mulberry germplasm to major causal fungus of root rot disease (in pot grown plants) 2. Molecular characterization of germplasm accessions and finally identify the contrasts (resistant and susceptible) 3. Develop mapping populations (by crossing of contrasts) in mulberry 	<ol style="list-style-type: none"> 1. A total of 211 entries of panel of diverse germplasm (PDG) were screened for root rot disease resistance in mulberry using a virulent strain of <i>Macrophomina phaseolina</i>. Based on the disease reaction, resistant (20) and highly susceptible (49) genotypes (contrasts) were identified and categorised. 2. New mulberry specific microsatellite markers (174 F/R primers) were synthesized from the public domain including from the MulSatDB (an in-house web-database for mulberry SSRs) and screened for polymorphism. Among the total, 55 were polymorphic and used in genotyping of the panel. 3. The PDG with 228 entries was established in an experimental plot under ARBD for trait evaluation and also as a back-up germplasm. 	<p>The identified contrasts will be utilized for the development of mapping population and location of QTLs contributing to root rot resistance in mulberry (Project proposal under Mulberry Network Program).</p> <p>Action will be initiated to utilize the identified resistant resources in mulberry crop improvement program by MAS</p>

2	<p>PIB-3507: Development of Distinctness, Uniformity and Stability (DUS) descriptors for Mulberry (<i>Morus</i> spp.) and their Validation (PPV & FRA funded)</p> <p>Dr. V. Sivaprasad, Dr. V. Girish Naik, Dr. Gandhi Doss and Mr. K. Rajashekar and T. Thippeswamy</p> <p>Rs. 9.5 lakhs (7.24 lakhs)</p>	Apr 2013	Mar 2016	<ol style="list-style-type: none"> 1. Develop and validate descriptors for mulberry. 2. Identify distinctiveness and specific morphological, biochemical/molecular markers, and their stability. 3. To characterize the extent of variability. 4. Develop database for the descriptors of mulberry to add on to INDUS (India Database for DUS). 	<ol style="list-style-type: none"> 1. Identified and validated 35 characteristics with states of expression for DUS testing in mulberry 2. Selected 32 example varieties for different states of expressions 3. Draft DUS test guidelines for mulberry was prepared and submitted to PPV & FRA, New Delhi. The Authority constituted Task Force for evaluation and finalization of the DUS test guidelines for the crop which was held on 14.06.2016. Accordingly, the revised DUS test guidelines was submitted to the Authority on 06.07.2016. 	<p>The DUS test guidelines for mulberry developed in the project will be used to validate the distinctness, uniformity and stability of extent and new varieties of protection of plant breeders' right and farmers' rights</p> <p>Action will be initiated to test the DUS criterion for important extent and new varieties for plant variety protection</p>
3	<p>AIT-3445: Development of robust bivoltine hybrids of silkworm, <i>Bombyx mori</i> L, tolerant to high temperature environment of the tropics through DNA marker assisted selection</p> <p>S. Manthira Moorthy, S. K. Ashwath (Upto June 2015), Kariyappa and N. Chandrakanth</p> <p>17.0 lakhs</p>	Jan 2011	Dec 2015	<ol style="list-style-type: none"> 1. Identification of DNA markers (SSR) linked to thermo -tolerance in silkworm 2. Development of thermo tolerant silkworm breeds / hybrids through DNA marker assisted selection 	<ol style="list-style-type: none"> 1. Two SSR (LFL0329, LFL1123) markers linked with thermo tolerance in silkworm was identified. 2. Four oval thermo tolerant breeds (TT1, TT2, TT3,TT4) and Four dumbbell thermo tolerant breeds (TT5,TT6,TT7,TT8) was developed employing SSR marker assisted selection. These breeds exhibited 70-84% survival and 18 to 20% shell at 36°C (5th Instar 2nd day to spinning @ 6hrs daily). 3. Two thermo tolerant 	<ol style="list-style-type: none"> 1. Two SSR (LFL0329, LFL1123) markers linked with thermo tolerance in silkworm was identified. 2. Four oval thermo tolerant breeds (TT1, TT2, TT3,TT4) and Four dumbbell thermo tolerant breeds (TT5,TT6,TT7,TT8) was developed employing SSR marker assisted selection. These breeds exhibited 70-84% survival and 18 to 20% shell at 36°C (5th Instar 2nd day to spinning @ 6hrs daily). 3. Two thermo tolerant single hybrid (TT2 x TT6& TT2 x TT) was developed and it is

					<p>single hybrid (TT2 x TT6 & TT2 x TT) was developed and it is characterized by 60-65 kg/100 dfls; shell % of 21-22%, reelability of 85-88%, raw silk % of 15-16% and renditta of 6.0-6.5</p> <p>4. Two thermo tolerant double hybrid [(TT21 x TT67) & (TT23 x TT67)] was developed. The hybrid is characterized with cocoon yield of 60-65 kg/100 dfls; shell % of 22-23%, reelability of 88-90%, raw silk % of 15-17% and renditta of 5.5-6.5.</p>	<p>characterized by 60-65 kg/100 dfls; shell % of 21-22%, reelability of 85-88%, raw silk % of 15-16% and renditta of 6.0-6.5</p> <p>4. Two thermo tolerant double hybrid [(TT21 x TT67) & (TT23 x TT67)] was developed. The hybrid is characterized with cocoon yield of 60-65 kg/100 dfls; shell % of 22-23%, reelability of 88-90%, raw silk % of 15-17% and renditta of 5.5-6.5.</p>
4	<p>AIB-3506: Studies on Thermo Tolerance, Heat Shock Protein Synthesis during Thermal Shock and Inbreeding in Silkworm, <i>Bombyx Mori</i> L (DST-SERB funded)</p> <p>S. Manthira Moorthy and N. Chandrakanth</p> <p>12.0 lakhs</p>	Jan 2014	Dec 2015	<ol style="list-style-type: none"> 1. Identification of critical thermal maximum in silkworm 2. To analyse the profile of different forms of hsps in silkworm under thermal stress 	<ol style="list-style-type: none"> 1. Identification of critical thermal maximum in silkworm. Breeds: CSR2, SK4C Nistari & Pure Mysore ; Treatments : (a) 4 & 5th instar larvae exposed from day1 to spinning at 30, 32,34,36 & 38°C for 3,6,9, and 12 hrs every day, (b) 5th instar 3rd day larvae were subjected to 36,38,40,42 °C continuously till death/ spinning Irrespective of treatment, high reduction in pupation% was observed in all breeds when larvae were exposed to longer duration (9 & 12hr). The pupation% is varied 	<p>This analysis will help to unravel the proteins, which give the thermo tolerance capacity to silkworm at higher temperature and their functional role. Also information would be useful in developing thermo tolerant silkworm</p>

					<p>between 71.5 & 8, 67 & 3, 46 & 0, 32 & 0 in the 5th instar larvae exposed at 38°C for 3,6,9,12 hrs respectively CSR2 not able to survived on 5th day after 9 &12 hr of exposure. When 5th instar 3rd day larvae were subjected to 36,38,40,42 °C continuously till death/spinning, Nistari was able to survive (4%) for 7hrs at 42 °C, followed by PM (6hrs, 25%), SK4C (4hr,20%) and CSR2(3hr, 40%). Interestingly at 38°C, Nistari was able survive upto 70hrs(10%) followed by PM (52hr, 4%), SK4C (48hr,14%), CSR2(34hr,10%). Hence 38°C is ideal for conducting experiments on thermo tolerance in silkworm. Further critical thermal maximum in silkworm is genotype & duration specific.</p> <p>2. To analyse the profile of different forms of hsps in silkworm under thermal stress SDS page analysis revealed ~11 protein bands in the haemolymph. Of which significant changes observed in expression of ~ 23kDa, ~30kDa ,~f 35kDa , ~70kDa and ~90kDa in all treatments and breeds</p> <p>2-D Electrophoresis pattern of CSR2 exposed at 38°C for 1-5 days for 6hr daily revealed</p>
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					<p>286 protein spots on first day of exposure to thermal stress, ~ 322, ~ 306, ~337 and ~ 390 on day2, day 3, day 4 and day 5, respectively. The proteins expressed are ranged between ~6kDa to >100kDa. Out of these, several unique expression patterns were observed and some are either up- regulated or down-regulated as compared to control. In general up-regulation of 90-100kDa and shsp (40-35kDa) family and down regulation of 20kDa family during stress. Protein of ~110kDa (pI 8.5) and ~30kDa (pI 3), which was present in control gradually showed reduced intensity indicating under expression over a period of time and to nil expression. Similarly, ~35kDa (pI 9.5) spot also disappeared gradually in subsequent days. A new spot (~72kDa/pI5) appeared after 1st day of exposure, whereas ~64kDa (pI4) protein spot disappeared and a newer ~48kDa (pI8.5) protein spot was present on day 4 protein profile.</p> <p>A total of 7 protein spots were selected for Mass spectrometry from CSR2 subjected to 38°C for six hours daily. Out of seven spots, two corresponded to stress proteins (70kDa,</p>	
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					20kDa) and two matched with protein metabolism (34.24kDa & 59.96kDa). Although the silkworm (<i>B. mori</i>) genome sequence is available, these protein spots could not be matched. After intensified verification, these were predicted as immune-related protein CDIL (58.85kDa) and tRNA ligase (32.65kDa). Yet another spot corresponding to 6.46kDa was identified and classified as an uncharacterized protein.	
5	<p>PRE 3512: Studies on pest status and eco-friendly management of thrips (<i>Pseudodendrothrips mori</i>) (Thysanoptera: Thripidae) on mulberry in Tamil Nadu and Karnataka (In collaboration with NBAII, Bengaluru)</p> <p>S.Mahiba Helen (PI), Chandish R.Ballal¹, N.Dhahira Beevi², M.Noble Morrison³, S.Rajakumar, V.Sivaprasad</p> <p>Rs. 7,41,400/-</p>	Apr 2014	Mar 2016	<ol style="list-style-type: none"> 1. Survey on infestation of thrips on mulberry in selected sericultural areas of Tamil Nadu and Karnataka 2. Collection of different natural enemies available in the mulberry ecosystem 3. Laboratory evaluation of predatory potential of selected natural enemies 	<p>Survey method for thrips on mulberry has been standardized</p> <ol style="list-style-type: none"> 1. Survey result indicated that Tamil Nadu recorded higher incidence of thrips (11-30 thrips/ leaf) as compared to Karnataka (1-10 thrips / leaf). Correlation with weather parameters indicated that thrips abundance was not influenced by weather parameters 2. A significant negative correlation with rainfall indicated that rainfall increases the thrips abundance decreases <p>Four species of predatory thrips Franklinothrips vespiformis, Mymarothrips garuda, Aduncothrips asiaticus, Scolothrips asura; three species of anthocorids viz., Orius maxidentex, Orius dravidiensis, Montandoniola</p>	Useful in developing Effective control of natural enemies against mulberry thrips

					<p>indica; and one species of predatory Trombidiforme mites have been recorded as probable natural enemies for the management of mulberry thrips.</p> <p>3. Laboratory studies on predatory potential of <i>C. zastrowi sillemi</i>, <i>B. pallescens</i> and <i>F. vespiformis</i> on mulberry thrips indicated that <i>C. zastrowi sillemi</i> could able to feed more than 800 thrips nymphs within 8-10 days period.</p>	
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