

## Concluded projects during 2021-22

#	Title & code of the project	Project period	Objectives	Output	Plan for Utilization of the Project Output:	Remarks
1	[AIT 4727] - Integrated biotechnological approach towards improvement of quality and productivity of tropical tasar silk.	December 2017 - June 2021).				
	<b>Sub Project-1: Sequencing of whole-genome of tasar silkworm, <i>Antheraea mylitta</i>. (in collaboration with NIAB, Hyderabad).</b>		<ul style="list-style-type: none"> <li>To perform the shallow sequencing of a single pupae of Daba ecorace of <i>A. mylitta</i>.</li> <li>To perform the whole genome sequencing of Daba ecorace of <i>A. mylitta</i>.</li> <li>To study the molecular basis of different qualitative and quantitative traits of <i>A. mylitta</i> through whole genome sequencing.</li> </ul>	<ul style="list-style-type: none"> <li>For the first time <i>de novo</i> whole genome sequencing of <i>A. mylitta</i> has been done and submitted to the NCBI.</li> </ul>	<ul style="list-style-type: none"> <li>It was a basic &amp; exploratory nature of study.</li> <li>This information may be useful in future functional genomic works.</li> </ul>	
	<b>Sub Project-2: Genetic Characterization of Tropical Tasar Silkworm,</b>		<ul style="list-style-type: none"> <li>To survey and collect various <i>A. mylitta</i> ecoraces existing in India.</li> <li>To construct</li> </ul>	<ul style="list-style-type: none"> <li>Total 18 ecoraces of <i>A. Mylitta</i> and one new ecorace, "Gajapati" (not showing similarity with already reported ecoraces</li> </ul>	<ul style="list-style-type: none"> <li>New ecorace, Gajapati has been isolated from Odisha which could be used in further <i>in-situ</i></li> </ul>	

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	<b><i>Antheraea mylitta</i> through Single Nucleotide Polymorphism Based Molecular Barcode. (in collaboration with University of Hyderabad).</b>		<p>RADseq library for sequencing.</p> <ul style="list-style-type: none"> <li>To assemble paired-end RAD sequence for in silico SNP detection.</li> <li>To genetically characterize all the ecoraces with validated SNPs.</li> </ul>	<p>of Odisha) has also been collected from Odisha, along with metadata.</p> <ul style="list-style-type: none"> <li>Total SNPs among all ecoraces with biological replicates were observed to be 156,058. Ecorace Bhandara followed by Andhra Local were observed to have more number of SNPs and ecorace Jiribam has lesser number within the same population.</li> <li>Total SNPs among all ecoraces with biological replicates were observed to be 156,058. Ecorace Bhandara followed by Andhra Local were observed to have more number of SNPs and ecorace Jiribam has lesser within the same population.</li> </ul>	<p>breeding and conservation programme.</p> <ul style="list-style-type: none"> <li>Complete SNP based characterization and documentation of <i>A. mylitta</i>.</li> <li>ddRADseq and SNP data could be utilized for MAS in breeding programme.</li> <li>Complete SNP based characterization and documentation of <i>A. mylitta</i> ecoraces.</li> <li>ddRADseq and SNP data could be utilized for MAS in breeding programme.</li> <li>SNP based barcoding system for specific identification of <i>A. mylitta</i> ecoraces.</li> </ul>	
2	<b>[AIE-3555]</b> Cryopreservation of Tasar silkworm, <i>Antheraea mylitta</i> semen and its Artificial insemination	April, 2016 - September, 2021	<ul style="list-style-type: none"> <li>To develop the technique for <i>A. mylitta</i> semen collection and its cryopreservation.</li> <li>To develop a method for artificial insemination in</li> </ul>	<ul style="list-style-type: none"> <li><i>A. mylitta</i> semen collection and semen cryopreservation performed.</li> <li>Artificial insemination done but hatching not observed in inseminated moths.</li> </ul>	<ul style="list-style-type: none"> <li>This was basic &amp; exploratory nature of study, information generated.</li> </ul>	

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			tasar silkworm <i>A. mylitta</i> .			
3	<b>[AIT-4728]</b> Identification most-active cocoonase of sericigenous insects and its variant through molecular characterization. (in collaboration with IISER, Pune and BIT, Mesra)	March, 2018- August 2021	<ul style="list-style-type: none"> <li>• Purification of cocoonase from natural sources &amp; recombinant expression in <i>E. coli</i>.</li> <li>• Enzymatic activity measurements of cocoonase variants from natural sources and recombinant expression.</li> <li>• Characterization of post-translational modifications of cocoonase and comparison of their activities.</li> <li>• To evaluate the most suitable cocoonase/variants for its future application in silk processing through</li> </ul>	<ul style="list-style-type: none"> <li>• Polyclonal antibody of cocoonase specific enzyme was prepared.</li> <li>• Crystal structure analysis, DNA sequencing and mass spectrometry confirmed that there are no post-translational modifications in cocoonase.</li> <li>• Based on structural study and cocoon softening ability, the trypsin and papain were identified as cocoonase variants.</li> <li>• The findings are being validated under TOT project MOE 04014 MI.</li> </ul>	<ul style="list-style-type: none"> <li>• Enzyme based cocoon softening technique will be utilized for precise purpose at CFC level for the production of value added organic tasar silk with natural beautiful colour.</li> <li>• Patent will be filed for (Utility of the cocoonase and its variants in tasar silk processing).</li> </ul>	

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			characterization of the properties of silk produced using cocoonase treatment.			
4	[AIT 04002 SI] Selection of Stable Thermo-tolerant Line(s) of Tropical Tasar Silkworm <i>Antheraea mylitta</i> Through SCAR Markers.	February 2019 – March 2022	<ul style="list-style-type: none"> <li>To select stable thermo-tolerant line(s) of tropical tasar silkworm, <i>Antheraea mylitta</i>.</li> <li>To validate developed SCAR markers for Marker Assisted Selection of thermo-tolerant line(s).</li> <li>To conduct multi-location trial of stable thermo-tolerant line(s) in tasar rearing hotter zones.</li> </ul>	<ul style="list-style-type: none"> <li>Selected thermo-tolerance could be stabilized and multiplied further at RECs &amp; BSM&amp;TCs and utilized at farmers' level in hot &amp; dry conditions.</li> <li>Developed SCAR markers will be utilized for the specific selection of thermo-tolerant lines.</li> <li>Signaling network underlying thermo-tolerance of <i>A. mylitta</i> had been analysed and being validated for further confirmation.</li> </ul>	<ul style="list-style-type: none"> <li>Next phase of the research project is proposed to stabilize the selected thermo-tolerant lines and conduct multilocation trial in nested units and BSMTCS in the hotter zones.</li> <li>The Developed SCAR markers would be useful for the specific selection of thermo-tolerant lines.</li> </ul>	
5	[PIN04001SI] Development of a package for optimum nutritional requirement of tasar host plants	February, 2019 – March, 2022	<ul style="list-style-type: none"> <li>To supply each plant with adequate nutrients in balanced proportion to ensure healthy vegetative growth</li> </ul>	<ul style="list-style-type: none"> <li>Field experiment has been completed for assessment of optimum nutritional requirement of tasar food plants.</li> <li>Fertilizer (macro &amp; micronutrients)</li> </ul>	<ul style="list-style-type: none"> <li>Developed fertilizers recommendation chart will be tried under OST and after validation it will be recommended for field utilization.</li> </ul>	

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	for production of quality tasar cocoons		<p>and more nutritive leaves.</p> <ul style="list-style-type: none"> <li>To refine and optimize the nutrient application package that is ecologically safe, technically sound and economically feasible for soil health of tasar plantations and cocoon quality.</li> </ul>	<p>recommendation chart has been developed for tasar food plants for production of quality cocoons.</p> <ul style="list-style-type: none"> <li></li> </ul>	<ul style="list-style-type: none"> <li>Fertilizers recommendation chart will be utilized by farmers to manage soil health of tasar plantations &amp; improve cocoon quality.</li> <li></li> </ul>	