(TENDER NOTICE No.: SASMIRA/COE-Agrotech/NTTM/NAU/Demo/02)

THE SYNTHETIC & ART SILK MILLS' RESEARCH ASSOCIATION
COE-AGROTECH
(Approved Body of the Ministry of Textiles, Govt. of India)
SASMIRA, Sasmira Marg, Worli, Mumbai-400 030.
Tel: 91-22-24935351/52, Fax: 91-22-24930225
E-mail: ed@sasmira.org / project@sasmira.org
Website: www.sasmira.org

TENDER DOCUMENT FOR ESTABLISHMENT OF CLIMATE SMART AGROTEXTILE DEMONSTRATION CENTER TO REVOLUTIONLISE AGRICULTURE THROUGH DIGITIZED MICROCLIMATE FARMING

Tender No.	**:**	**SASMIRA/COE-Agrotech/NTTM/NAU/Demo/02**
Date	**:**	**01/12/2023**
Approximate Cost (Rs.)	**:**	**223.69 Lakhs**

CONTENTS

Note: Interpretation of any term /word /clause lies with COE – AGROTECH, SASMIRA

THE SYNTHETIC & ART SILK MILLS' RESEARCH ASSOCIATION
COE-AGROTECH
(Approved Body of the Ministry of Textiles, Govt. of India)
SASMIRA, Sasmira Marg, Worli, Mumbai-400 030.
Tel: 91-22-24935351/52, Fax: 91-22-24930225
E-mail: ed@sasmira.org / project@sasmira.org
Website: www.sasmira.org

1. DETAILS OF TENDER AND TENDER NOTICE

Tender in sealed cover is invited by COE AGROTECH, SASMIRA from manufacturers/ authorized dealers / Complete Solution providers **for Establishment of Climate Smart Agrotextile Demonstration Center to Revolutionlise Agriculture through Digitized Microclimate Farming.** Details of the demonstration models, their specifications, are given in respective **Annexures** of this the tender document. Interpretation of the terms & conditions and other related issues in the tender would lie with SASMIRA only. Tenders can be obtained from The Synthetic & Art Silk Mills' Research Association (SASMIRA), Sasmira Marg, Worli, Mumbai – 400030. The tender document can also be downloaded from the websites of COE-Agrotech, SASMIRA at www.sasmira.org and National Technical Textile Mission (NTTM) https://nttm.texmin.gov.in. Partial / Part bidding is not allowed. However, the Price Bid should be submitted separately for each component of the Demonstration Centre. Tender documents are available: From **01/12/2023 at 11.00 AM** and LAST DATE FOR SUBMISSION OF DULY FILLED UP SEALED TENDER AT SASMIRA, MUMBAI is **21/12/2023 upto 3.00 PM,** the Technical Bid will be opened on **22/12/2023** at **3.00 PM** at SASMIRA. SASMIRA reserves the right to accept or reject any or all the bids either in full or any part at its discretion without assigning any reason thereof. Address for Communication: Senior Director, COE-Agrotech, SASMIRA, The Synthetic & Art Silk Mills' Research Association, Sasmira Marg, Worli, Mumbai -400030, Tel.: 24935351/52 Fax 24930225, Email: ed@sasmira.org, / project@sasmira.org

SCHEDULE FOR INVITATION OF TENDER FOR

ESTABLISHMENT OF CLIMATE SMART AGROTEXTILE DEMONSTRATION CENTER TO REVOLUTIONLISE AGRICULTURE THROUGH DIGITIZED MICROCLIMATE FARMING

To	
Issue of Tender	**From 01/12/2023 at 1100 hrs**
Tender Due Date	**21/12/2023 upto 15 00 hrs**.
Technical Bid Opening Date	**22/12/2023 at 15 00 hrs**.
Price Offer Opening Date & Time:	Will be communicated once the technical scrutiny of the tender document will be completed.
Department Name/Authority Name	Senior Director, COE-Agrotech, SASMIRA, The Synthetic & Art Silk Mills' Research Association, Sasmira Marg, Worli, Mumbai - 400030 Tel: 022-24935351, Fax: 022-24930225 Email: ed@sasmira.org/ project@sasmira.org
Tender Submission Address	Senior Director, COE-Agrotech, SASMIRA, The Synthetic & Art Silk Mills' Research Association, Sasmira Marg, Worli, Mumbai -400030
Price Offer	The agency shall submit their best possible price offer in given format as per **Annexure-3.** **Separate Price bids should be submitted for each Component of the Demonstration Center. Part bidding is not allowed.**

Bidder's Signature and Seal

2. INTRODUCTION

Indian involvement in the traditional textile industry has historically been strong. Indian firms are modernizing to advance up the value chain in the technical textiles industry, though, as a result of the shifting global landscape and the growing demands of both domestic and foreign markets that place a premium on the final product's functionality. By being future-ready in terms of technology, innovation, and product process standardization, as well as by complying with international manufacturing standards, traditional textile businesses may seize the latent development opportunity offered by technical textiles. Technical textiles have enormous potential for growth because they are employed in a variety of critical industries like Agriculture, Infrastructure, Defence, Automobiles, Medical and Hygiene.

The Agrotextiles sector is one of the forerunners amongst the technical textile segments. Engineered textiles known as "agrotextiles" are employed in agriculture for their practical advantages. The pressure on food production in agriculture has intensified as a result of the ongoing global population growth. As a result, in order to meet existing demands for space and water, it is important to raise the output and quality of agricultural products. However, conventional techniques, such the application of pesticides and herbicides, cannot completely supply this rising need. In order to achieve a larger total yield and better quality agro-produce, the agriculture and horticulture industries have realised the necessity to pursue diverse technologies.

Agrotextiles are used in agriculture, animal husbandry, sericulture, aquaculture, and horticulture to control the negative effects of environmental and climatic factors on crop production and cattle rearing, regulate the nutrient uptake of plants, aid in silk worm rearing, and support post-harvest operations. Agrotextiles have been shown to be effective throughout the world in protecting crops from all outside influences as well as increasing agricultural productivity. COE-Agrotech, SASMIRA studies and a pilot-scale demonstration conducted as part of the Ministry of Textiles' initiatives to promote the use of agrotextiles in NER and ROI have demonstrated the benefits of using agrotextiles, particularly for horticulture and agricultural crops, to increase per-hectare production and product quality.

The Ministry of Textiles aims to position India as a global leader in Technical Textiles. Therefore, it has launched National Technical Textiles Mission (NTTM) from FY 2020-21. The Mission will aim at increasing average growth rate through market development, market promotion, international technical collaborations, investment promotions and ‘Make in India’ initiatives. Under this initiative Ministry of Textiles has approved a proposal for Establishment of Climate Smart Agrotextile Demonstration Center to Revolutionlise Agriculture through Digitized Microclimate Farming at NAU, Navsari.

Hence, the COE - Agrotech, SASMIRA is inviting sealed tender from Agrotextile manufacturers/ authorised dealers/suppliers/ complete solution providers willing to provide complete solution who can establish the demonstration centre of Shade net House / Ground Cover/ Crop Cover/ Vermicomposting beds etc. and can provide operational training and required agronomical knowledge to farmers.

Proposal in the form of sealed tender is requested in complete accordance with the documents/attachments as per following guidelines. The COE-Agrotech, SASMIRA is calling the best price offer from the interested agencies to carry out the work as described in this document. The bidder will have to provide the price offer as per the format given in **Annexure-3** through two bid sealed tender system only.

TENDER FORM

To

Senior Director,
COE-Agrotech, SASMIRA,
The Synthetic & Art Silk Mills' Research Association,
Sasmira Marg, Worli,
Mumbai -400030

Dear Sir,

I/We have read and examined the following Tender Documents relating to the **Designing, Construction / installation, testing and commissioning of Climate Smart Agrotextile Demonstration Center to Revolutionlise Agriculture through Digitized Microclimate Farming.**

1. General Conditions
2. Specific condition of contract
3. Terms and Conditions of Contract
4. Special Terms and conditions of Contract
5. Technical specification
6. Price Bid
7. All annexure of the tender document

I/We hereby offer to execute the work complete in all respects specified in the underwritten Memorandum within the time specified therein at the rates specified in the bill of Quantities (price bid) and in accordance, with the specifications, designs, drawings and instructions in writing referred to in the conditions of tender.

Tenderers Signature and Seal

3. GENERAL TERMS AND CONDITIONS

1. The Ministry of Textiles, Government of India has approved establishment of a "Climate Smart Agrotextile Demonstration Center to Revolutionlise Agriculture through Digitized Microclimate Farming", with various agrotextile modules for a period of three years under National Technical Textile Mission (NTTM).

2. Sealed tenders are hereby invited (in two bid format) from Agrotextile manufacturers/ authorised dealers/ suppliers/ Service providers willing to provide complete solution for the **Designing, Construction/ installation, Testing and Commissioning of a "Climate Smart Agrotextile Demonstration Center to Revolutionlise Agriculture through Digitized Microclimate Farming"** with the Agrotextile products given in **Annexure- 1 and Annexure-2 at Navsari Agricultural University (NAU), Eru Char Rasta, Dandi Road, Navsari, Gujarat – 396 450.** The tender document consists of General Conditions, Instructions to bidders, General Information, Tender form, Terms and Conditions of Contract Agreement, Special Terms and conditions of Contract, Technical specification and Price Bid. Purchase of tender document is obligatory on the part of the tenderers & bid in no other form will be accepted. The tender document can also be downloaded from websites: www.sasmira.org and National Technical Textile Mission (NTTM) https://nttm.texmin.gov.in

3. COE-Agrotech, SASMIRA, Mumbai will be the tender issuing authority. Tender documents shall be issued by COE-Agrotech, SASMIRA at Mumbai to Agrotextile manufacturers/ authorized dealers/ suppliers/ complete solution providers willing to provide complete solution.

4. Modifications, if any, made in the above documents will be done by addenda / corrigenda, copies of which will be sent to each bidder before the due date of the tender. One copy should be signed, sealed and submitted along with the technical bids. Tender to be submitted, is as detailed hereafter. **The bidder shall not make any additions / deletions to or amend the text of the documents** except in so far as may be necessary to comply with any addenda / corrigenda issued. The bidders shall use only tender documents as issued for submitting his bid and shall comply with all terms and conditions.

5. All pages of tender documents shall be signed by the person authorized to file the tender.

6. The general power of attorney of the authorized person should be provided as per the **Annexure - 4**. The full name of the person authorized to file the tender, designation, current

and main office address, Phone No., Fax No. & E-mail address shall be indicated in the tender.

7. The tender documents shall be placed in sealed cover as mentioned in Procedure of Submission of tender and addressed to The Senior Director, COE-Agrotech, SASMIRA, The Synthetic & Art Silk Mills' Research Association, Sasmira Marg, Worli, Mumbai-400030. The filled and sealed tender should be submitted in two separate envelopes containing technical & price bids to the COE-Agrotech, SASMIRA, Mumbai on or before **21/12/2023 upto 3.00 P.M**. The date of Technical Bid opening will be conveyed to the bidders as well as on our website. Any envelope received after the said date and time shall not be entertained under any circumstances and no consideration what so-ever shall be given to anything that might be contained in any such envelope.

8. The time allowed for the Designing, Construction, Testing and Commissioning of above Demonstration Center is **3 months** to be reckoned from the date of written order to commence the work.

9. **Earnest Money Deposit**
    a. Tender must be accompanied by Earnest Money Deposit (EMD) of **Rs. 5,00,000/- (Rupees Five Lakhs only)** in the form of DD/pay order in favour of The Synthetic & Art Silk Mills' Research Association, payable at Mumbai. EMD shall be paid in Indian currency only.

    b. The EMD deposited by the successful bidders shall be held back towards the security deposit and will be refunded on submission of Bank Guarantee.

    c. The EMD of the unsuccessful bidder will be returned within two weeks from the date of opening of the commercial bids.

10. Any question regarding the tender document and discrepancies shall be directed to the Tender Issuing Authority in **writing minimum 3 days prior** to the due date of submission of tender. The Tender Issuing Authority will issue all clarifications, interpretations, meanings and specific directions, if any, in duplicate in writing to all the bidders. One copy of these shall be returned duly signed and seal affixed along with the bids.

11. The bidder shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender and about the rates quoted by him and cover all his obligations under the tender.

12. Bids submitted by Agrotextile manufacturers/ authorised dealers/ suppliers/ complete solution provider willing to provide complete solution shall be considered.

13. The bidder will submit his tender in prescribed format as per **Annexure- 3** after examining the tender documents, scope of work, specific conditions of contract, Instructions to bidders, General Information, Terms and Conditions of contract agreement, technical specification, Compliance statement, Price Bid, Price Schedule, special terms and conditions of contract, specific conditions of contract.

14. The offer shall remain **valid for 120 days** from the date of opening of Tender.

15. **The bidder shall submit a list of the similar work done for establishment of shade net House /Ground Cover/ Crop Cover/ Vermicomposting Bed / Pond liner manufactured / installed during the past three years along with complete details i.e names of person concerned, designation, telephone Nos., addresses of Institutes / Organizations, value of the works and copies of the completion certificates along with the technical bid.**

16. COE-Agrotech, SASMIRA will not be responsible for any typographical errors/ambiguity/ additions /omissions committed by the bidder while filling up of the tender.

17. Authority of signing

a. If the tender is submitted by an individual, it shall be signed by him.

b. If the tender is submitted by a proprietary firm, it shall be signed by the proprietor.

c. If the tender is submitted by a partnership firm/consortium, it shall be signed by all the partners of the firm or by a partner holding the power of attorney for the firm for signing the tender, in which case, a certified copy of power of attorney (**Annexure - 4**) shall accompany the technical bid.

d. If the tender is submitted by a limited company or a corporation, it shall be signed by a duly authorized person or the person holding the power of attorney for signing the tender, in which case a certified copy of the power of attorney shall accompany the technical bid.

18. Price & currency bid

i. The tender shall be filled in English with a neat hand written / typed and all the figures and words shall be legible.

ii. The rates shall be written both in words and in figures. The bidder shall also show the amount of each item, the total of each section and the grand total of the whole tender.

iii. Correction, if any, shall be made by crossing out, initialing with date and rewriting.

iv. In case of conflict between the figures and words in the rates, the later shall prevail.

v. The tenders shall be verified by the bidder for accuracy in the arithmetical calculations, prior to submission.

19. Technical details shall contain

a. Original Tender document duly signed by the authorized person on all pages.

b. Compliance to technical specifications of the Agrotextile Demonstration Center/products for which bids are submitted – Authorized person to indicate the compliance of technical specifications in the respective pages of the tender document and sign the same.

c. Compliance to the terms and conditions of the tender document - Authorized person to specify, "**All the above terms and conditions will be complied with" and signed in respective pages of the tender documents, where "terms and conditions**" are given.

d. The bidder should provide stipulated delivery, installation and commissioning schedule of the Demonstration Center – Authorized person to specify on the stipulated schedule page "delivery, installation and commissioning schedule given above will be complied with" and signed in respective pages of the tender documents. Adherence to the "**delivery, installation and commissioning schedule of the Demonstration Center**".

e. Proof that the bidder is Agrotextile manufacturer/authorized dealer/supplier willing to provide complete solution for the products/ Demonstration Center for which the bid is submitted. The bidder should provide its company profile as per **Annexure 5**. See **Annexure – 6** for eligibility criteria for submission of the tender.

f. List of organisations in India, along with Contact Person, address, Tel. No., Fax No. etc., to which similar product/model of the demonstration center were supplied.

g. Compliance that the bidder has manufactured or supplied the products during the past 3 years and performance report from at least 3 such users for the past 3 years.

h. Covering letter, in the letter head of the bidder stating:

   i. That the minimum warranty period is of three years.

   ii. That the bid conforms to the terms and conditions of the tender

   iii. Confirmation about the supply of Materials/Samples for checking the performance and Certification of the same.

   iv. Confirmation that the quoted rates are valid till 120 days from the date of opening of the tender

   v. An undertaking by the bidder as per **Annexure-7**

i. Addenda / corrigenda /clarification issued by COE-Agrotech, SASMIRA before due date of tender, duly signed by the authorized person.

j. Descriptive leaflet/brochure giving the technical details of the demonstration model/product.

k. A letter indicating assumptions, criterion, technical alternative etc., if any. However, the alternatives suggested by the bidder would not be taken as the basis for technical/commercial evaluation of the bids.

l. The probable life expectancy of the product/demonstration model under normal conditions should be stated.

m. Power of attorney authorizing the person who has filed the tender, if applicable as per **Annexure - 4**.

20. Commercial details shall contain

a. Total cost of the main Demonstration Center and accessories required for the functioning of the Demonstration Center etc., duly filled and signed **in the format prescribed in the tender document** at **Annexure - 3.** No money other than the total indicated above will be payable on any account.

b. The pre installation requirement if any should be mentioned in the bid.

21. Validity of the tender

Rates quoted by the bidder shall be valid till **120 days from the date of opening of the tender,** or to an extended date as agreed on mutually.

The Bidder shall not withdraw or revise or alter any conditions, rate(s) quoted within this stated period, unless he is called upon to do so on mutual agreement / negotiations.

22. Opening of Technical Bid

The Technical Bid of the tender shall be opened by a Purchase Committee constituted by the competent authority, COE - Agrotech, SASMIRA, at the time, date and venue as given in the "Tender Notice".

23. COE-Agrotech, SASMIRA does not bind itself to accept the lowest or any tender and reserves the right to reject any or all tenders without assigning any reason.

24. COE-Agrotech, SASMIRA will not pay any expense, whatsoever incurred by tenderer for the preparation and submission of tenders.

25. The notice inviting tender, will form part of the contract agreement to be executed by the successful bidder with CEO-Agrotech, SASMIRA

26. If a bidder whose tender is accepted fails to undertake the work as per terms of the contract within 10 days to be reckoned from the date of issue of award letter (Purchase order), the EMD deposited will be forfeited.

27. Agreement (Undertaking)

The bidder shall sign an undertaking on a stamp paper worth ` 100.00 in the format prescribed in **Annexure - 7**. A copy of The Purchase order once received should be duly signed and returned as a token of acceptance of all the terms and conditions of the Purchase Order and this tender document or any other document put up by COE Agrotech - SASMIRA.

28. All the correspondence on the tender shall be addressed to The Senior Director, COE-Agrotech, SASMIRA, The Synthetic & Art Silk Mills Research Association, Mumbai and

any communication addressed to anyone else in any manner shall not to be binding upon COE-Agrotech, SASMIRA.

29. Criterion for rejection

i. COE-Agrotech, SASMIRA reserves the right to accept or reject any tender or reject all tenders without giving any reasons whatsoever for their decision.

ii. Tenders are liable to be rejected in which any of the prescribed particulars / information is either missing or incomplete in any respect and/or if the prescribed conditions are not fulfilled.

iii. Tenders which are found to be technically non - responsive shall be rejected and their commercial details shall not be considered.

iv. Canvassing in connection with tender is strictly prohibited and tender submitted by bidder who resorts to canvassing will be liable to rejection.

v. Tenders containing specific conditions of the bidder other than the terms and conditions given in the tender document and not acceptable to COE-Agrotech, SASMIRA are liable to be rejected.

vi. If the validity of the tender is not up to **120 days from the date of opening of the tender**; the tender will be rejected.

vii. If the tender document duly signed by the authorized person on all pages is not submitted, the tender will be rejected.

viii. COE-Agrotech, SASMIRA caters to wide range of customers / stakeholders including the manufacturers/ exporters and farmers, Cultivators etc. Hence, Purchase Committee may at its discretion give preferences to more popular brands of products, which give results that, are widely accepted nationally and internationally by buyers and the decision of the Committee will be final.

ix. Before submission of the tender, the prospective bidders are expected to examine technical specifications of the products / Demonstration center required, terms and conditions, etc., given in this tender document. Failure to furnish all information required in the tender document may result in the rejection of the bid.

x. COE-Agrotech, SASMIRA reserves the right to cancel models/ products, from the list of requirements of demonstration centers without assigning any reason thereof.

30. **Selection criteria**

a. The selection of the bidder shall be Cost Based; however, qualification of the bidder will be based on their technical capabilities to carry out the work. In final Evaluation, the bidder who will score the qualifying marks of 65% in technical bid would be eligible for opening of financial bid. The financial bids of the technically disqualified bidders would not be considered. The Criteria for evaluating the Technical Bids would be as given in **Annexure -8**

b. Financially lowest bidder from the technically qualified bidders would be selected for the proposed work.

c. The decision of the Purchase Committee in this regard will be final.

d. Proposal Presentations: COE-Agrotech, SASMIRA may invite each pre-qualified bidder to make a presentation before the Purchase Committee. The purpose of such presentations would be to allow the bidders to present the key points in their tender. The bids of those bidders who will not present themselves before the purchase committee for presentation will not be considered.

31. Submission of a tender by a bidder implies that he has read all the stipulations contained in this tender document and has acquainted himself of the nature, scope and specifications of the items to be followed.

4. SPECIFIC CONDITIONS OF CONTRACT

Name of work: Designing, Construction / Installation, Testing & Commissioning of "Climate Smart Agrotextile Demonstration Center to Revolutionlise Agriculture through Digitized Microclimate Farming", training and continuous running of Demonstration center for 3 years in **the Navsari Agricultural University (NAU), Navsari.** Details of the Demonstration site is given in **Annexure -1**

1. Cost details are to be filled up in the prescribed format as given at **Annexure –3** for all the demonstration models and materials as applicable.

2. All accessories, start-up kit required for installation & commissioning of the demonstration centers are to be specified and quoted

3. The successful bidder will be henceforth termed as Demo-center service provider (DCSP).

4. The SASMIRA, Demo-center site owner and Demo-center service provider (DCSP) will jointly conduct the training programmes. The demo centre site owner and the Demo-center service provider (DCSP), with the help of COE Agrotech, SASMIRA will be required to formulate training programmes for the stakeholder within the local area and such activities will be funded through the COE Agrotech, SASMIRA from the separate sub-component.

5. The release of funds for establishment and maintenance of demo centre will be as under:

    i. 10% of the total project cost, including 3 years maintenance as per the accepted bidder's (DCSP) bid value, will be released once the project is sanctioned and work order is placed on the bidder and MOU is signed with the Demo center site owner. However, the bidder has to execute a bank guarantee for the **like amount valid for 3 years** as a security against performance.

    ii. 30% of the bid value will be released on the installation and commissioning of all demo modules and material as per schedule, duly verified by COE Agrotech, SASMIRA.

    iii. 30% of the bid value will be released on the completion of first crop cycle and submission of harvesting report, duly verified by COE Agrotech, SASMIRA.

    iv. 10% of the bid value will be released at the beginning of the second year of the demonstration centre upon receipt of progress cum performance report from the NAU/ COE.

v. 10% of the bid value will be released at the beginning of the third year of the demonstration centre upon receipt of progress cum performance report from the NAU/COE.

vi. 10% of the bid value will be released at the end of the third year of the demonstration centre upon receipt of progress cum performance report from the NAU/COE.

vii. **The bank Guarantee** will be released at the end of the 3rd year after receipt of completion certificate and performance reports from NAU to COE Agrotech, SASMIRA.

6. **Scope of work:** The scope of work consists of providing/ Establishment of Agrotextile Demonstration center as described in the description of work, schedule of construction and bill of quantities and specifications as described in the contract documents. The Demo-center service provider (DCSP) shall carryout and completes the said work under the contract in every respect in accordance with this contract documents under directions and to the entire satisfaction of the COE-Agrotech, SASMIRA. If any item of the work to be executed is not covered under specification, the same shall be executed as per IS, ISI standard / ISI code of practice as decided by the COE-Agrotech, SASMIRA.

   It is not the intent to specify completely herein all aspect of design and constructional features of Agrotextile Demonstration center and details of work to be carried out, nevertheless, the construction and work shall confirm in all respect to high standard of engineering, design and workmanship and shall be capable of performing in continuous commercial operation in a manner acceptable to the COE-Agrotech, SASMIRA, who will interpret the meaning of the specifications and drawings and shall have the right to reject or accept any work or material, which in its assessment is not complete to meet the requirements of the specifications and or applicable code, and standards mentioned elsewhere in the specifications.

7. **Sub-contracting**: The bidder may sub-contract part of the work with the permission of COE-Agrotech, SASMIRA. However, overall responsibility of the bidder for compliance with the contract terms does not alter by Sub-contracting.

8. **Consortium**:
   The bidder may form a consortium of manufacturers/ authorized dealers/ suppliers willing to provide complete solution to execute the total project. Such Consortiums/ Tie-ups of two or more firms are also permitted to bid in the project.

In case the Applicant proposes to apply as a group of entities (the "Consortium"), coming together to implement the Proposal under an existing binding agreement in the form of a Consortium Agreement –

I. Such Consortium Agreement should clearly define the roles and responsibilities of individual members and their inter-se relationship, particularly with reference to financial, technical and operating obligations of the individual members for the Proposal.

II. Such Consortium Agreement should clearly specify one member as the 'Lead Member', who shall be responsible for the execution of the Proposal and respective obligations as may be agreed between Government / COE-Agrotech, SASMIRA and such Consortium on behalf of the members of such Consortium, who shall issue a Power of Attorney signed by all the members of the Consortium in favour of the Lead Member to act for and on behalf of all the members of the Consortium.

III. Such Consortium Agreement should be for a minimum of scheme period or till the proposed project is executed, whichever is later

IV. Such Consortium should clearly specify that all Consortium members shall be jointly and severally liable for the execution of the Proposal in accordance with the terms and conditions of the agreement(s) as may be executed with Government / COE-Agrotech, SASMIRA.

V. The Lead Member of the Consortium shall be the single point of contact for Government / COE-Agrotech, SASMIRA with relation to project execution, monitoring and any matter connected therewith.

VI. A copy of the Consortium Agreement is required to be submitted along with the Proposal, failing which the Proposal shall be considered incomplete.

VII. Such members of the Consortium may also enter into a joint venture agreement to execute the Proposal incorporating the above terms, however in all circumstances, the members forming such a joint venture shall remain jointly and severely liable for the execution of the Proposal in accordance with the terms and conditions of the agreement(s) as may be executed with Government / COE-Agrotech, SASMIRA.

9. **Conformity with statutory Acts, Rules, Standards and Codes:** The construction and installation shall be carried out in conformity with Ministry of Textiles (MOT), GoI scheme guidelines / rules. The installation shall also conform to requirements of the scheme.

10. **Safety codes and regulations**: The bidder shall at his own expenses arrange for the safety provisions as per statutory regulations wherever applicable.

11. **Related documents:** The technical specifications shall be read in congestion with the general conditions of the contract as well as the schedule. In the event of any discrepancy between these specifications and inter connected contract documents, the technical requirements as per tender specifications shall prevail.

12. **Information to be supplied by DCSP after award of work:** within a period of 10 days from the date of receipt of award letter, DCSP shall provide his program bar chart for submission of preliminary drawings (designing), construction, testing, commissioning and handing over to the COE-Agrotech, SASMIRA/ Demo site owner. This should be co-related with the completion program. The contractor shall be required to submit in triplicate the following drawings & information for approval of the COE-Agrotech, SASMIRA before commissioning the work:

    a. All general arrangement drawings
    b. Details of foundations for construction, load data, locations etc., of various assembled equipment as may be needed generally by other agencies for purpose of their work.
    c. Complete layout dimensions for every unit / group of units with dimensions required for erection purposes.
    d. Any other drawing / information not specifically mentioned above but deemed to be necessary for the job by the Demo-center service provider (DCSP).

13. **Commencement of work and completion of drawings:** On award of work, the DCSP shall submit within 10 days 3 sets of detailed working drawings, containing details of construction layout, piping routes & size, critical sectional details as required to COE-Agrotech, SASMIRA. Any alternatives proposed by the COE-Agrotech, SASMIRA shall be incorporated and three fresh sets of drawings along with commented drawings shall be resubmitted by the contractor. After final approval 3 sets of approved working drawings (to scale) shall be submitted for the exclusive use of and retention by COE-Agrotech, SASMIRA.

14. **Operation and Maintenance Manuals:** Prior to completion of the work and handing over the Demonstration Center the contractor shall submit 3 set of following details:

    i. Comprehensive operation instructions, preventive and routine maintenance schedules
    ii. Manufacturer's construction catalogues and operating & maintenance instructions
    iii. Layout diagrams, piping scheme diagrams

iv. List of recommended spare parts with spare part codes, specifications & source of procurements.

15. **DCSP to provide all for testing:** The Demo-center service provider (DCSP) shall provide and pay for all necessary tools, on site instruments gadgets and testing equipment required for conducting various on-site tests. Any defects in material and / or in workmanship detected during initial testing shall be replaced/ rectified by the DCSP at his own cost. **The structural material should be tested as per Indian / equivalent international standards at an Accredited Laboratory and the test report should be provided to COE-Agrotech, SASMIRA at no additional cost.**

All agrotextile material testing shall be carried out in COE-Agrotech, SASMIRA as per Indian standards or equivalent international standards, if standards are not available then COE-Agrotech developed standards will be applicable to its entire satisfaction on extra cost to the Demo-center service provider (DCSP). The installation shall be commissioned after approval by COE-Agrotech, SASMIRA.

16. **Virtual completion:** On satisfactory completion of initial testing and commissioning, the installation shall be put to continuous running test for a period of 2 days before commissioning of demonstration center. Any defect in material and/ or in workmanship detected in the course of testing shall be replaced/ rectified by the DCSP at his own cost to the entire satisfaction of the COE-Agrotech, SASMIRA. The test shall be repeated after removal of defects. After successful completion of above tests, the demonstration center shall be taken over.

17. **Guarantee and defect liability period:** The different components of demonstration center covered by this contract shall be guaranteed by the Demo-center service provider (DCSP) against faulty material and workmanship for a period of **36 months** from the date of virtual completion. Any part found defective shall be replaced free of all costs by the DCSP. The DCSP shall guarantee that all components and equipment shall work satisfactorily and that the performance and efficiency of the component and equipment shall not be less than the specified values. If performance of component and equipment during guarantee period is not found satisfactory, the guarantee period will be extended till satisfactory performance is established for further period of reasonable time decided by COE-Agrotech, SASMIRA.

The services of the DCSP's personnel if requisitioned during the defect liability period shall be made available free of any cost to COE-Agrotech, SASMIRA. If the defects noticed during the guarantee period are not remedial within a reasonable time and / or some

equipment or system as a whole remain out of order for a total period of one month (4 weeks) (Unless or otherwise extended) COE-Agrotech, SASMIRA shall have the right to remedy the defects at the contractor's risk & cost without prejudice to any other rights.

18. **Maintenance:** During the period of service (initial 3 years), the DCSP shall provide at no extra cost necessary material and personnel to carry out the repairs & routine maintenance of demonstration center/model. The contractor shall attend to all problems experienced in the operation of the system within a reasonable time but not more than 72 Hrs of receiving the complaint and take corrective action immediately.

19. **Training of personnel at site:** In order to enable COE-Agrotech, SASMIRA/ site owner's staff to get acquainted with the operation and maintenance of the demonstration center/ model, the Demo-center service provider (DCSP) at no extra cost to COE-Agrotech, SASMIRA/ site owner shall train the personnel during the period of construction, installation, testing and during continuous running and maintenance of the demonstration center (initial 3 years).

20. **Storage of materials and safe custody:** Lockable storage space, if available shall be made available to the DCSP by Demo center site owner. However, the DCSP shall be responsible for watch & ward and safe custody of his equipment and installation till they are formally taken over by site owner. Non-availability of lockable storage space due to any reasons shall not relieve the DCSP of his contractual obligations in any way.

21. **Completion period:** All works, of supply installation, testing, commissioning and handing over of the demonstration center in accordance with this contract shall be completed within the stipulated period or within the extended time as has been allowed by the COE-Agrotech, SASMIRA.

22. Selected bidder will have to execute an agreement with COE Agrotech, SASMIRA covering all conditions of Tender document and any other conditions as put by COE-Agrotech, SASMIRA.

Bidder's Signature and Seal

5. TERMS & CONDITIONS OF CONTRACT AGREEMENT

1. **Bank Guarantee as Performance Security:**

   The DCSP shall submit a bank guarantee amounting 10% of total work value of demonstration center to the COE-Agrotech, SASMIRA on approval to execute the project valid for a period of 3 years as per format given in the **Annexure - 9**. The COE-Agrotech, SASMIRA is taken this bank guarantee to safeguard its interest. The bank guarantee would be relieved by the COE-Agrotech, SASMIRA after 3 (three) years from the demonstration completion and commissioning date (i.e. end of warranty period). The project completion date shall mean the completion of inspection by the COE-Agrotech, SASMIRA or its nominated representative subject to satisfactory completion of the work.

2. **Compensation Clause**: The time allowed for carrying out the work as entered in the tender shall be strictly observed by the DCSP, and shall be reckoned from the **10th day** of the date on which the order to commence the work is given to the DCSP. The DCSP shall prepare and submit the details of delivery and installation for the execution of the said work within **Ten days** of award of work for approval of the COE-Agrotech, SASMIRA. The work on the contract shall be executed according to the approved schedule as aforesaid and shall throughout the stipulated period of the contract be proceeded with all due diligence **and the DCSP shall pay as compensation an amount equal to one percent or such smaller amount as COE-Agrotech, SASMIRA may decide on the value of work as per contract**, for every week that the work remains un-commenced or unfinished after the dates mutually agreed upon by the parties. Further to ensure good progress during the execution of the work, the DCSP shall be bound in all cases in which the time allowed for any work exceeds one month to complete one fourth of the whole of the work before one fourth of the whole time allowed under the contract has elapsed, one half of work before one half of such time has elapsed and three fourth of the work before three fourth of such time has elapsed. Provided always that the entire amount of compensation to be paid under the provisions of this clause shall not exceed **Ten Percent** of the awarded cost of work as shown in the tender. The **COE-Agrotech, SASMIRA** on a representation from the DCSP, is however; empowered to reduce the amount of compensation and its decision in writing shall be final.

3. **Time Extension**: If the DCSP shall desire an extension of the time limit for completion of the work on the grounds of his having been unavoidably hindered in its execution or on any other ground he shall apply in writing to the COE-Agrotech, SASMIRA within 10 days of the date of the hindrance on account of which he desires such extensions. Decision to grant the extension upto 30 days rests with the COE Agrotech, SASMIRA.

4. **Completion of Work**: Without prejudice to the rights of COE-Agrotech, SASMIRA under any clause hereinafter contained on completion of the work, the DCSP shall be furnished with a certificate by the Demo center site owner/ COE or their representative of such completion, but no such certificate shall be given nor shall the work be considered to be complete until the DCSP shall have removed from the premises on which the work has been executed, all surplus materials and rubbish, and cleaning off the dirt from site said to have been completed.

5. Operation and Management of the Demonstration Center:

A typical demonstration centre will require the following activities:

The demonstration center includes demonstration of **agrotextile models** as well as **control plot** (Production of same crops under natural conditions in the open field) of equal size of respective agrotextile model with same crop production as the crops under the agrotextile model.

I. Supply and installation of Agrotextiles material and maintenance thereof for the duration of the project i.e., at least three years

II. Supply and installation of mechanical support structure wherever required and maintenance thereof for the duration of the project i.e., at least three years

III. Supply and installation of Irrigation and Fertigation system wherever required and maintenance thereof for the duration of the project i.e., at least three years

IV. Supply and installation of **Internet of Things (IoT)** systems and maintenance thereof for the duration of three years, for real time monitoring of the microclimate inside the agrotextile structure as well as in the open field cultivation. To regulate and analyse the growth parameters of the crops cultivated during each crop cycle. Installation of digital display dashboards to showcase the microclimatic conditions with its analysis.

V. Supply of seed and seedlings; Manures, Fertilizers and pesticides and other agricultural materials as per the requirement of the centre for the entire duration of the project i.e., for three years (at least 8 crop cycles)

VI. Land preparation and sowing and harvesting operations

VII. Post-harvest storage, Grading & packaging arrangements.

VIII. Engagement of technical and farm manpower for the above activities.

IX. Video recording of plant growth at different stages to showcase the impact of agrotextile products on the crop growth and Audio-Video content creation at various stages of crop growth would be facilitated to the identified vendor.

X. Providing training to farmers/ horticulturists etc. and conducting demonstrations, Capacity building programmes for farmers/ agriculturists and stakeholders.

XI. The DCSP should co-ordinate with COE, NAU and service providers for video recording at various stages of the crop cycle during the demonstration center installation and operational period.

XII. Installation / creation of control room for the IoT, Irrigation, fertigation and solar systems operation control.

XIII. **Agronomical Services**

a. The 'Demo-centre Service Provider' will manage the operation of demonstration center for a period of 3 years and demonstrate the commercial viability of the project.

b. For the successful implementation of the project and to ensure envisaged benefits out of this demonstration, the 'Demo-centre Service Provider' shall provide agronomy services related with protected cultivation as well as control plot production. The duration of the agronomy services will be for three years.

c. The agronomy services to be provided by the 'Demo-centre Service Provider' must include the advise for selection of crop, variety of seeds and other related agriculture inputs and also advise for taking best crop based on the prevailing market condition with an objective to maximise the earning.

d. The 'Demo-centre Service Provider' will organize the cultivation of mutually agreed vegetables/ crops.

e. The 'Demo-centre Service Provider' will be responsible for organizing complete cultivation operations which will include arrangement of inputs, pre-harvest operations, labour, technical supervision. During this period Demo center Site Owner (NAU) will provide land, water and power for the operations of the project and he will have the sole right on the produce and its marketing.

f. During this period, a competent person deputed by the 'Demo-centre Service Provider' will pay regular visits to the demonstration center. The list of competent personnel along with details of qualification and experience has to be provided to the COE-Agrotech, SASMIRA as per the format given in **Annexure -10.** The 'Demo-centre Service Provider' will maintain records of such visit and submit the same to the COE-Agrotech, SASMIRA on regular basis.

g. The 'Demo-centre Service Provider' will maintain records of the project in terms of use of inputs labour and expenses thereof for each crop cycle.

h. The 'Demo-centre Service Provider' shall provide operational training of minimum 15 days to the Demo-center site Owner or its nominated member and farmers during the training sessions.

i. 'Demo-centre Service Provider' and Demo-center site owner will assist in demonstration of the projects to farmers and other visitors at the site.

j. The 'Demo-centre Service Provider' shall provide all necessary superintendence during execution of the work and as along thereafter as may be necessary for proper fulfilling of the obligations under the contract.

6. **Carrying Out of Work**: All the work shall be carried out strictly and in accordance with the specifications given in the tender to the total satisfaction of the COE-Agrotech, SASMIRA. In the case of an item for which specification are not available in the said specifications relevant BIS specifications applicable as on the date of tenders shall be followed.

7. **Inspection of Work**: All work under or in course of execution or executed in pursuance of the contract shall at all times be open to the inspection and supervision of COE-Agrotech, SASMIRA, NTTM, site owner, or their in-charge of the work and the DCSP shall at all times, during the usual working hours and at all other times at which reasonable notice of the intention of the COE-Agrotech, NTTM to visit the works shall have been given to the DCSP, either himself be present to receive order and instructions or have a responsible representative duly accredited in writing present for that purpose. Orders given to the DCSP's representative shall be considered to have the same force as if they had been given to the DCSP himself.

8. **Insurance:** The Bidder should follow all safety standards and parameters during installation, commissioning and maintenance of each component of the Demonstration Centre. The following insurance cover is to be provided by the DCSP as per the Government Laws to the Employee/ Labour for the period from the start date till completion of entire work.

I. Cover against accidental injuries caused by the DCSP's acts or omission to: Anyone authorized to be on the site
II. Cover against death caused by the DCSP's acts or omission to: Anyone authorized to be on the site

9. **No Escalation in rates shall be paid**.

10. The bidder may visit the demonstration center site or COE-Agrotech, SASMIRA before quoting the rates at their own cost.

11. The rates for material and equipments shall be inclusive of GST, other taxes, etc., and nothing extra will be paid.

12. The final payment shall be made only after completion of the work subject to certification by COE-Agrotech, SASMIRA

13. The Technical specifications of the Demonstration models, material, equipments required are detailed in **Annexure - 2** of this Tender Document.

14. Testing, Training & Commissioning of the demonstration center and supplied equipments will be done at site by the bidder in the presence of Scientist of COE-Agrotech, SASMIRA.

Annexure - 1

Details of the Demonstration center site

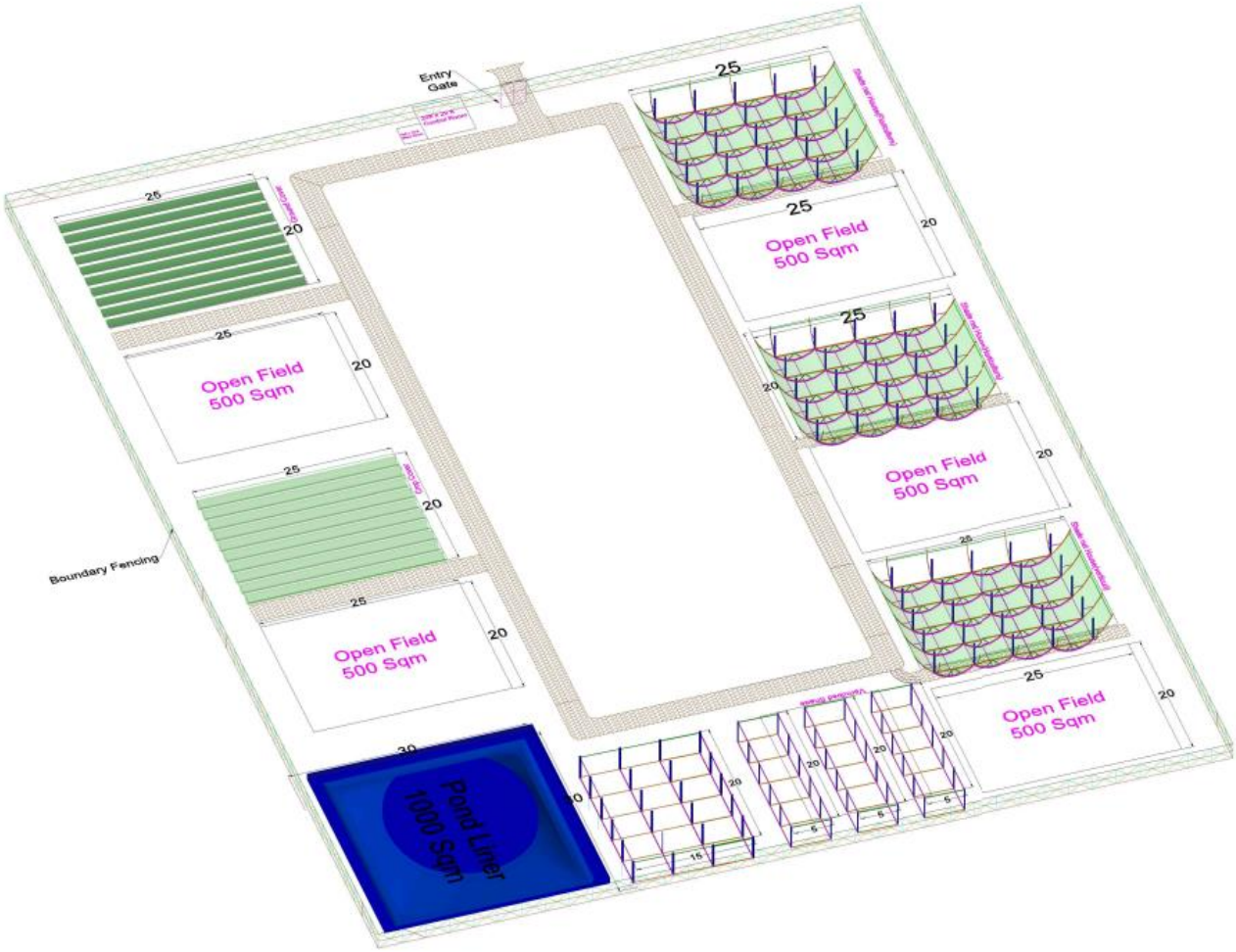
1. Demonstration Center Site Address:

Navsari Agricultural University (NAU),
Eru Char Rasta, Dandi Road,
Navsari, Gujarat – 396 450

2. Proposed Models

Sr. No.	Agrotextile Product Module	Agrotextile product Area	Control plot (Open Field)
1	Net House with PAR Perfect and Diffused Shade-net	500 sqm	500 Sqm
2	Vertical Farming under Shade-net	500 sqm	500 Sqm
3	Photoselective Shade-net House & Crop Support Net/Rope	500 sqm	500 Sqm
4	Medicinal Plant Nursery under Shade-net	300 sqm	Nil
5	Biodegradable/Compostable Ground Cover & Creeper Net 5.1 Woven Ground Cover	500 sqm	500 Sqm
	5.2 Biodegradable Jute Nonwoven / Woven Ground Cover	500 sqm	500 Sqm
6	Crop Cover	500 sqm	500 Sqm
7	Vermi-bed Set-up	10 beds	Nil
8	Pond-liner	30m x 30m x 6m	Nil
9	Fencing Net	Complete Demo Center borders	Nil

Bidder's Signature and Seal



Landscape Overview of Demonstration Centre (Illustration purpose only)

Actual layout and design are to be finalized by the selected bidder after site visit as per the available space and dimensions of the proposed site at Navsari Agricultural University, Navsari.

Annexure - 2

Technical Specifications for Construction of Demonstration Center

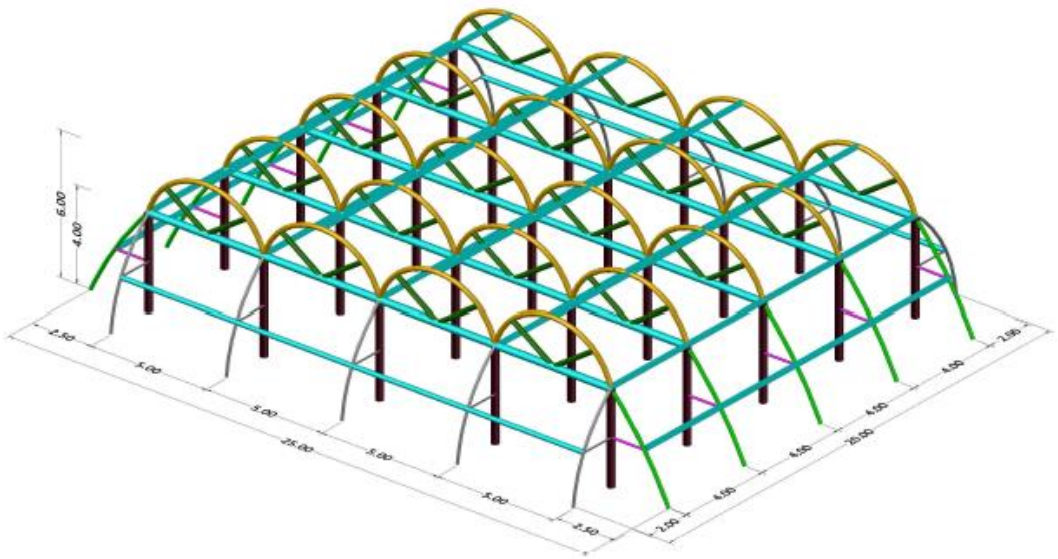
1. Net House with PAR Perfect and Diffused Shade-net

Sr. No.	Description	Specifications
1.	Product	Dome Shape (Aerodynamically Stable) shade net house
2.	Size	**500 Sq. m** Length of net house: 20/ 25 m (Or as per the space and layout of the demo centre) Width of net house: 25 / 20 m (Or as per the space and layout of the demo centre)
3.	Height	5.8 - 6.3 m from floor area. In case of dome shaped roof, the side height should be in between 4 m - 4.5 m and Centre height 5.8 m - 6.3 m.
4.	Structural design	The structural design must withstand wind speed of minimum 120-140 km/hr. and withstand crop load up to 25 kg/m^2 crop load. The structure must have the provision for opening one portion at either side for entries of small tractor/ power tiller for inter- cultural operations. The aerodynamics shape should be installed to avoid wind load.
5.	Structure / Material	Complete structure should be made of GI tubular pipes the structural member should be joined with fasteners properly. GI tubular pipes or equivalent section of light class conforming Indian Standards IS: 1161-1998, the structural member should be joined with fasteners properly. Columns: 76 mm OD, 3.2 mm thick Trusses, purlins and hockey: 60 mm OD, 2.9 mm thick Member for Truss, purlins & others: 48 mm OD, 2.9 mm thick
6.	Entrance room & Door	An entrance room of size 2.5 m x 2.5 m x 2.5 m (L x W x H) made of GI square pipe size 38mm x 38 mm having minimum wall thickness 2.6 mm need to be provided and covered with UV stabilized net.
7.	Cladding material: Agrotextile Shade net material	UV stabilized PAR Perfect shade net having high grade light diffusion capability with 50% shading factors (As per crop requirement) confirming to Indian Standards IS 16008: 2016. The life of the shade net should be minimum 3 years.
8.	Ground Cover (Mulching)	Woven fabric ground cover of 100 GSM with 1-3m width should be used for weed control. The ground cover should be UV stabilized and should have functional durability of

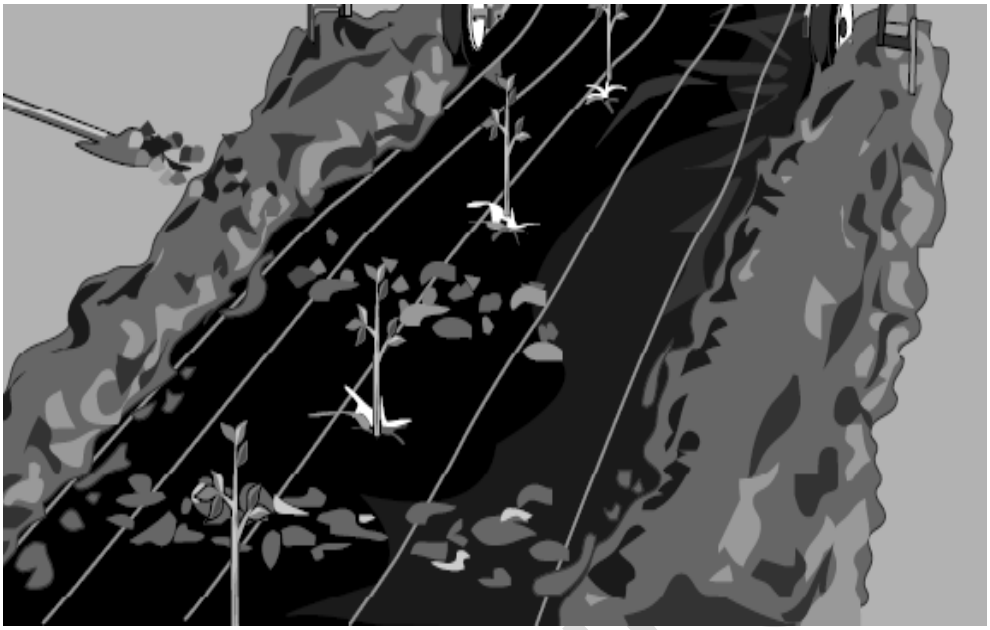
		minimum 3 years. The ground cover should conform to the Indian standard IS 16202: 2014 Color: Black / Black x white The ground cover fabrics should be used as per the crops and if required it should be changed for different crop cultivation in next crop cycle. The ground cover is to be used in control plot (open field) as well during each crop cycle.
9.	Fixing of cladding materials	All ends/joints of net house to be fixed with two-way aluminum profile with suitable locking arrangement such as zigzag high carbon steel with spring action wire of 2-3 mm diameter. Wooden batons or PVC grippers must not be used.
10.	Civil work	Depth of foundation need be kept at 90 cm or more depending upon soil type and prevailing wind conditions. GI pipes conforming to Indian Standards IS: 1161-1998 or equivalent sections should be grouted in cement concrete mixture with 1:2:4 ratios.
11.	Land preparation	Soil should be properly leveled. Prepare soil, complete beds, & ground cover application (mulching) before sowing, fertile soil media approved by NAU should be used for raised bed preparation.
12.	Drip irrigation System with fogging, misting facility & Fertigation System (With centralized Automatic Control unit)	Drip irrigation system inside shade net house need to be selected based on crop spacing along with fogging and misting facilities. The suggested bill of materials must have Sand Filter, Screen Filter, Control Valves, Bypass Assembly, Air Release Valve, Non-Return Valve, Throttle Valve, Flush Valve, Venturi Injector with manifold, PVC pipes, LDPE plain lateral, emitting pipe, foggers & misters to be fixed w.r.t design. Water tank and fittings & accessories (applicable only BIS standards for all irrigation components as well as water tank).
13.	Trellising system for vegetable.	Trellising system for vegetable should be provided as per crop requirement.
14.	Sensors	In Net House: PAR, Soil Moisture, Soil Temperature, CO_2 concentration, Air Temperature, Leaf wetness, UV radiation sensor, Electrical Conductivity of soil, Relative Humidity, Leaf Temperature, Evaporation Control Plot Sensors: Soil Moisture, Soil Temperature, Leaf wetness, Leaf Temperature, Evaporation, Electrical Conductivity of soil

		Note: PAR, Air Temperature and CO_2, Relative Humidity and UV readings for Control Plot will Considered from Weather Station
15.	Testing	All Agrotextile materials used in the shade net house to be tested by the COE-Agrotech, SASMIRA, Mumbai
Note: An equivalent size Control demo plot to be sown and demonstrated for same crop type in natural conditions for comparative study for the cost benefit analysis of the usage of Agrotextiles		

SHAD NET HOUSE
AREA - 25M X 20M = 500Sqm



Dome Shape (Aerodynamically Stable) Shade net house



Ground Cover

Technical Specifications for Construction of Demonstration Center

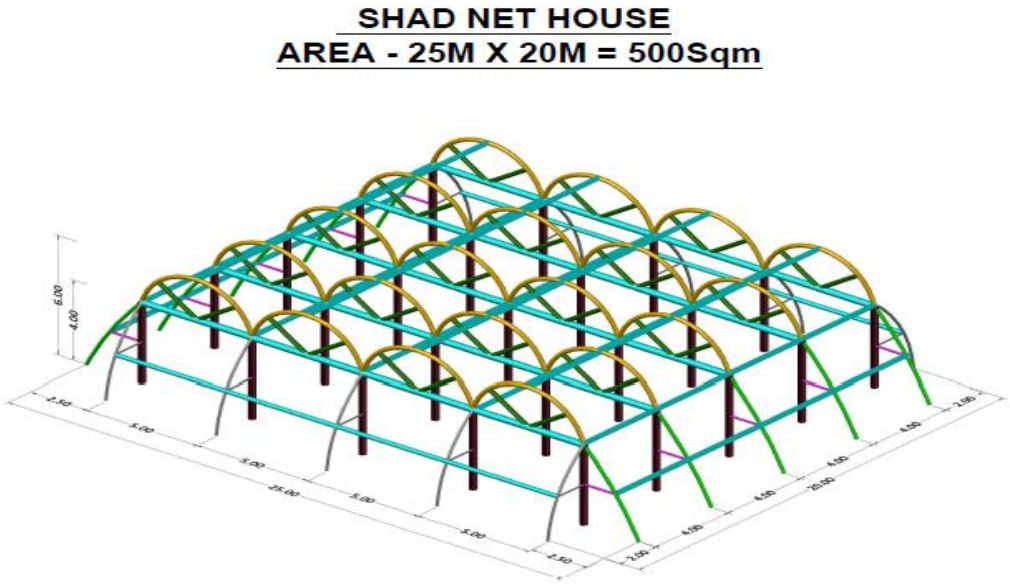
2. Vertical Farming under Shade-net

Sr. No.	Description	Specifications
1.	Product	Dome Shape (Aerodynamically Stable) shade net house
2.	Size	**500 Sq. m** Length of net house: 20/ 25 m (Or as per the space and layout of the demo centre) Width of net house: 25 / 20 m (Or as per the space and layout of the demo centre)
3.	Height	5.8 - 6.3 m from floor area. In case of dome shaped roof, the side height should be in between 4 m - 4.5 m and Centre height 5.8 m - 6.3 m.
4.	Structural design	The structural design must withstand wind speed of minimum 120-140 km/hr. and withstand crop load up to 25 kg/m^2 crop load. The structure must have the provision for opening one portion at either side for entries of small tractor/ power tiller for inter- cultural operations. The aerodynamics shape should be preferred to avoid wind load.

5.	Structure / Material	Complete structure should be made of GI tubular pipes the structural member should be joined with fasteners properly. GI tubular pipes or equivalent section of light class conforming Indian Standards IS: 1161-1998, the structural member should be joined with fasteners properly. Columns: 76 mm OD, 3.2 mm thick Trusses, purlins and hockey: 60 mm OD, 2.9 mm thick Member for Truss, purlins & others: 48 mm OD, 2.9 mm thick
6.	Entrance room & Door	An entrance room of size 2.5 m x 2.5 m x 2.5 m (L x W x H) made of GI square pipe size 38mm x 38 mm having minimum wall thickness 2.6 mm need to be provided and covered with UV stabilized net.
7.	Cladding material: Agrotextile Shade net material	UV stabilized shade net having 50% shading factors (As per crop requirement) confirming to Indian Standards IS 16008: 2016. The life of the shade net should be minimum 3 years.
8.	Vertical Farming - A-Shape planting system	A-shaped tower is a structure in **A-shaped** which contains tiers, growing troughs and irrigation system components. To establish the right size of A-shaped tower, design must consider - Total number of tiers: 7 - Material selection: Stainless steel / GI - Height of tower: 300 cm Distance between two A sides at grounded base = 300 cm Distance between two beams of A-shape at middle joining = 200 cm Top distance between two beams of A-shape = 50 cm **Growing troughs**: The growing troughs are the part which carry the soil and plants and where farming operation take place. **Troughs design** Depth of roots = 20 cm Distance between plants = 30 - 40 cm Trough length = 50 cm Trough Width = 50 cm Trough height = 25 cm Trough thickness = 0.5 cm

		Tiers design Tier length = 180 / 200 cm Tier width = 60 cm Tier thickness = 5 cm A vertical farming system with A-Shaped planting system as shown in the figure below would be installed in the shade net house. The frames would be made up of noncorrosive metallic / SS / GI material with beams, troughs and fixtures. The Vertical farming systems should be installed in the half portion of control plot (250 Sqm) for comparative analysis of vertical as well as conventional farming practices. Agrotextile products would be used for preparation of the beds in vertical farming system.
9.	Fixing of cladding materials	All ends/joints of net house to be fixed with two-way aluminum profile with suitable locking arrangement such as zigzag high carbon steel with spring action wire of 2-3 mm diameter. Wooden batons or PVC grippers must not be used.
10.	Civil work	Depth of foundation need be kept at 90 cm or more depending upon soil type and prevailing wind conditions. GI pipes conforming to Indian Standards IS: 1161-1998 or equivalent sections should be grouted in cement concrete mixture with 1:2:4 ratios.
11.	Soil Media to be used in the growing troughs	A fertile soil media alongwith Soil-less media (e.g. Coco peat), should be used for preparation of the beds in the vertical farming system. Prepare soil, complete beds, before sowing. The fertile soil media should be tested and approved by Soil and Water management department of Navsari Agricultural university before supply.
12.	Drip irrigation System with fogging, misting facility & Fertigation System (With centralized Automatic Control unit)	Drip irrigation system inside shade net house with vertical cultivation system need to be selected based on crop spacing along with fogging and misting facilities. The suggested bill of materials must have Sand Filter, Screen Filter, Control Valves, Bypass Assembly, Air Release Valve, Non-Return Valve, Throttle Valve, Flush Valve, Venturi Injector with manifold, PVC pipes, LDPE plain lateral, emitting pipe, foggers & misters to be fixed w.r.t design. Water tank and fittings & accessories (applicable only BIS standards for all irrigation components as well as water tank).
13.	Ground Cover	A woven ground cover (Mulch mat) of 100 GSM would be used on the ground in between the rows and below the A-Shaped beds to restrict the weed growth

14.	Sensors	In Net House: PAR, Soil Moisture, Soil Temperature, CO_2 concentration, Air Temperature, Leaf wetness, UV radiation sensor, Electrical Conductivity of soil, Relative Humidity, Leaf Temperature. Control Plot Sensors: Soil Moisture, Soil Temperature, Leaf wetness, Leaf Temperature, Electrical Conductivity of soil Note: PAR, Air Temperature and CO_2, Relative Humidity and UV readings for Control Plot will Considered from Weather Station
15.	Testing	All Agrotextile materials used in the shade net house to be tested by the COE-Agrotech, SASMIRA, Mumbai
Note: An equivalent size Control demo plot alongwith vertical farming system in 250 Sqm and conventional farming in 250 Sqm to be sown and demonstrated for same crop type in natural conditions for comparative study for the cost benefit analysis of the usage of Agrotextiles and vertical crop system with Agrotextiles.		



Dome Shape (Aerodynamically Stable) Shade net house

Bidder's Signature and Seal

Design of A-Shape planting system (to be installed in Shade net House)

Technical Specifications for Construction of Demonstration Center

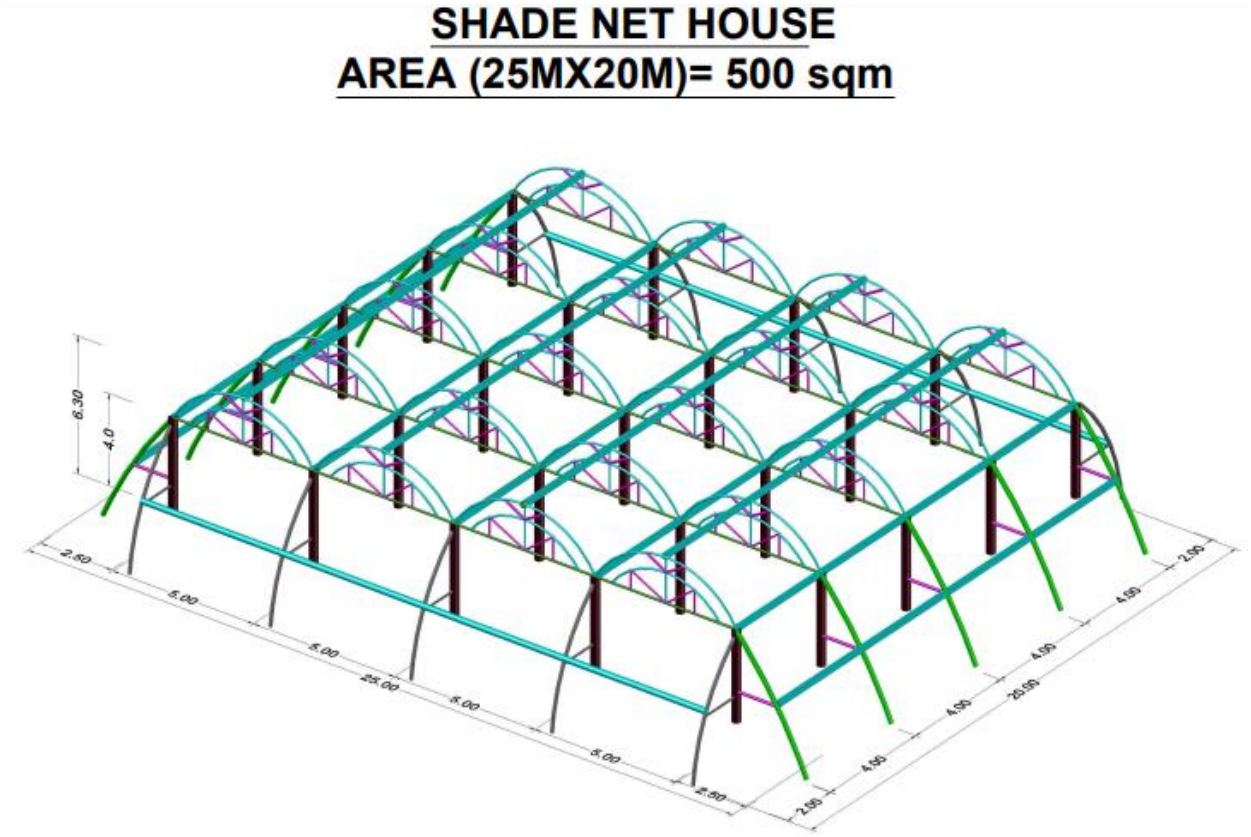
3. Photo-selective Shade-net House & Crop Support Net/Rope

Sr. No.	Description	Specifications
1.	Product	Double roof Dome Shape (Aerodynamically Stable) shade net house
2.	Size	**500 sqm** Length of net house: 20/ 25 m (Or As per the space and layout of the demo centre) Width of net house: 25 / 20 m (Or As per the space and layout of the demo centre)
3.	Height	5.8 - 6.3 m from floor area. In case of dome shaped roof, the side height should be in between 4 m - 4.5 m and Centre height 5.8 m - 6.3 m. The double roof domes should be constructed in such a way that one layer shade net to be rolled on a rod to manage the shading with respect to the change in the climate. The rolling should be mechanized to provide proper winding and unwinding.
4.	Structural design	The structural design must withstand wind speed of minimum 120-140 km/hr. and withstand crop load up to 25 kg/m^2 crop load. The structure must have the provision for opening one portion at either side for entries of small tractor/ power tiller for inter-

		cultural operations. The aerodynamics shape should be preferred to avoid wind load.
5.	Structure / Material	Complete structure should be made of GI tubular pipes the structural member should be joined with fasteners properly. GI tubular pipes or equivalent section of light class conforming Indian Standards IS: 1161-1998, the structural member should be joined with fasteners properly. Columns: 76 mm OD, 3.2 mm thick Trusses, purlins and hockey: 60 mm OD, 2.9 mm thick Member for Truss, purlins & others: 48 mm OD, 2.9 mm thick
6.	Entrance room & Door	An entrance room of size 2.5 m x 2.5 m x 2.5 m (L x W x H) made of GI square pipe size 38mm x 38 mm having minimum wall thickness 2.6 mm need to be provided and covered with UV stabilized net.
7.	Cladding material: Agrotextile Shade net material	UV stabilized Photoselective Shade-net with 35 to 50% shading factors (As per crop requirement) confirming to Indian Standards IS 16008: 2016. The color in the two layers would be varied in different climatic conditions. The life of the shade net should be minimum 3 years.
8.	Ground Cover (Mulching)	Woven fabric ground cover of 100 GSM with 1-3m width should be used for weed control. The ground cover should be UV stabilized and should have functional durability of minimum 3 years. The ground cover should conform to the Indian standard IS 16202: 2014 Color: Black / Black x white The ground cover fabrics should be used as per the crops and if required it should be changed for different crops cultivation in next crop cycle. The ground cover is to be used in control plot (open field) as well during each crop cycle.
9.	Fixing of cladding materials	All ends/joints of net house to be fixed with two-way aluminum profile with suitable locking arrangement such as zigzag high carbon steel with spring action wire of 2-3 mm diameter. Wooden batons or PVC grippers must not be used.
10.	Civil work	Depth of foundation need be kept at 90 cm or more depending upon soil type and prevailing wind conditions. GI pipes conforming to Indian Standards IS: 1161-1998 or equivalent sections should be grouted in cement concrete mixture with 1:2:4 ratios.

11.	Land preparation	Soil should be properly leveled. Fertile soil media for raised bed preparation should be supplied and used, complete beds, & ground cover application (mulching) before sowing. The fertile soil media should be tested and approved by Soil and Water management department of Navsari Agricultural university before supply.
12.	Drip irrigation System with fogging, misting facility & Fertigation System (With centralized Automatic Control unit)	Drip irrigation system inside shade net house need to be selected based on crop spacing along with fogging and misting facilities. The suggested bill of materials must have Sand Filter, Screen Filter, Control Valves, Bypass Assembly, Air Release Valve, Non-Return Valve, Throttle Valve, Flush Valve, Venturi Injector with manifold, PVC pipes, LDPE plain lateral, emitting pipe, foggers & misters to be fixed w.r.t design. Water tank and fittings & accessories (applicable only BIS standards for all irrigation components as well as water tank).
13.	Crop Support Net (Trellising system)	The Crop Support nets / Creeper net should be used for creeper crops to be cultivated under the shade net house and control plot.
14.	Sensors	In Net House: PAR, Soil Moisture, Soil Temperature, CO_2 concentration, Air Temperature, Leaf wetness, UV radiation sensor, Electrical Conductivity of soil, Relative Humidity, Leaf Temperature. Control Plot Sensors: Soil Moisture, Soil Temperature, Leaf wetness, Leaf Temperature, Electrical Conductivity of soil Note: PAR, Air Temperature and CO_2, Relative Humidity and UV readings for Control Plot will Considered from Weather Station
15.	Testing	All Agrotextile materials used in the shade net house to be tested by the COE-Agrotech, SASMIRA, Mumbai
Note: An equivalent size Control demo plot to be sown and demonstrated for same crop type in natural conditions for comparative study for the cost benefit analysis of the usage of agrotextiles		

Bidder's Signature and Seal



Indicative model of Double roof Photo-selective Shade-net House

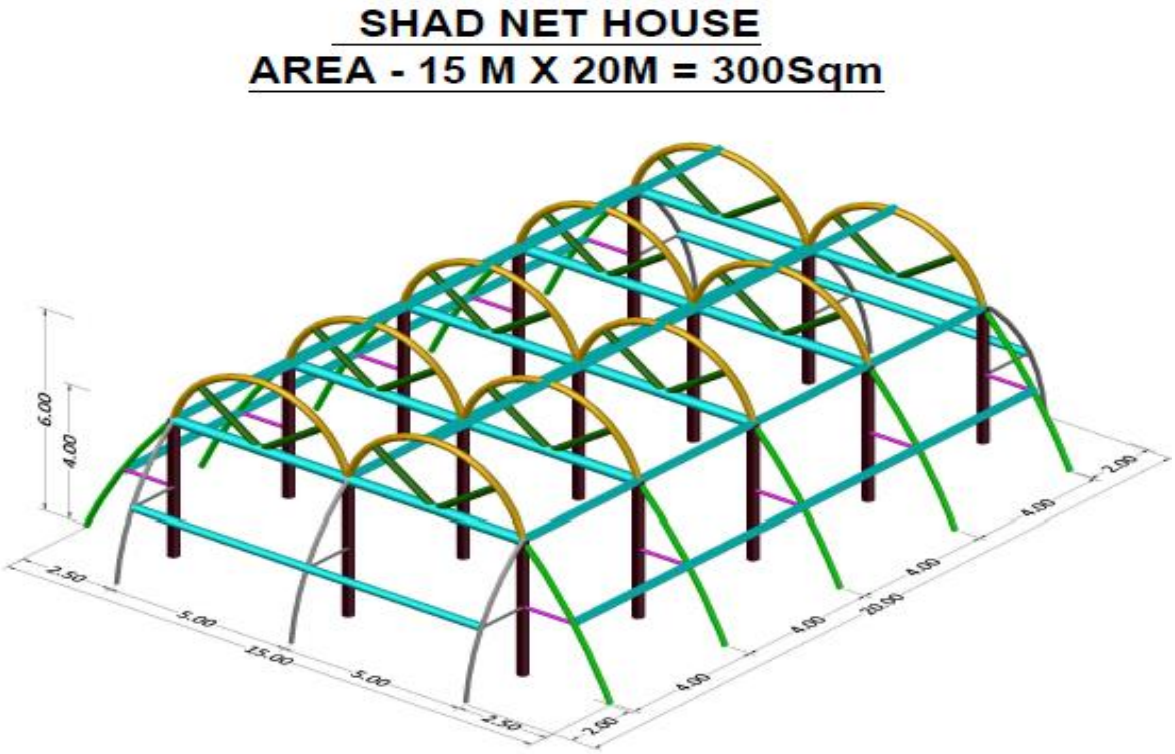
Technical Specifications for Construction of Demonstration Center

4. Medicinal Plant Nursery under Shade-net

Sr. No.	Description	Specifications
1.	Product	Dome Shape (Aerodynamically Stable) shade net house
2.	Size	**300 Sq. m** Length of net house: 15/ 20 m (Or As per the space and layout of the demo centre) Width of net house: 20 / 15 m (Or As per the space and layout of the demo centre)
3.	Height	5.8 - 6.3 m from floor area. In case of dome shaped roof, the side height should be in between 4 m - 4.5 m and Centre height 5.8 m - 6.3 m.

4.	Structural design	The structural design must withstand wind speed of minimum 120-140 km/hr. and withstand crop load up to 25 kg/m^2 crop load. The structure must have the provision for opening one portion at either side for entries of small tractor/ power tiller for inter- cultural operations. The aerodynamics shape should be preferred to avoid wind load.
5.	Structure / Material	Complete structure should be made of GI tubular pipes the structural member should be joined with fasteners properly. GI tubular pipes or equivalent section of light class conforming Indian Standards IS: 1161-1998, the structural member should be joined with fasteners properly. Columns: 76 mm OD, 3.2 mm thick Trusses, purlins and hockey: 60 mm OD, 2.9 mm thick Member for Truss, purlins & others: 48 mm OD, 2.9 mm thick
6.	Entrance room & Door	An entrance room of size 2.5 m x 2.5 m x 2.5 m (L x W x H) made of GI square pipe size 38mm x 38 mm having minimum wall thickness 2.6 mm need to be provided and covered with UV stabilized net.
7.	Cladding material: Agrotextile Shade net material	UV stabilized Shade-net with 50% / 75% shading factors (As per crop requirement) confirming to Indian Standards IS 16008: 2016. The life of the shade net should be minimum 3 years.
8.	Ground Cover (Mulching)	Woven fabric ground cover of 100 GSM with 1-3m width should be used for weed control. The ground cover should be UV stabilized and should have functional durability of minimum 3 years. The ground cover should conform to the Indian standard IS 16202: 2014 Color: Black / Black x white
9.	Fixing of cladding materials	All ends/joints of net house to be fixed with two-way aluminum profile with suitable locking arrangement such as zigzag high carbon steel with spring action wire of 2-3 mm diameter. Wooden batons or PVC grippers must not be used.
10.	Civil work	Depth of foundation need be kept at 90 cm or more depending upon soil type and prevailing wind conditions. GI pipes conforming to Indian Standards IS: 1161-1998 or equivalent sections should be grouted in cement concrete mixture with 1:2:4 ratios.
11.	Irrigation System with Fertigation System (With	Irrigation system inside shade net house need to be installed for irrigation of seedlings with fertigation in regular intervals.

	centralized Automatic Control unit)	
12.	Sensors	PAR, Air temperature, Relative Humidity, CO_2
13.	Testing	All Agrotextile materials used in the shade net house to be tested by the COE-Agrotech, SASMIRA, Mumbai
Note: An equivalent size Control demo plot to be sown and demonstrated for same crop type in natural conditions for comparative study for the cost benefit analysis of the usage of agrotextiles		



Indicative model of Shade-net House

Bidder's Signature and Seal

Technical Specifications for Construction of Demonstration Center

5. Biodegradable/Compostable Ground Cover & Creeper Net

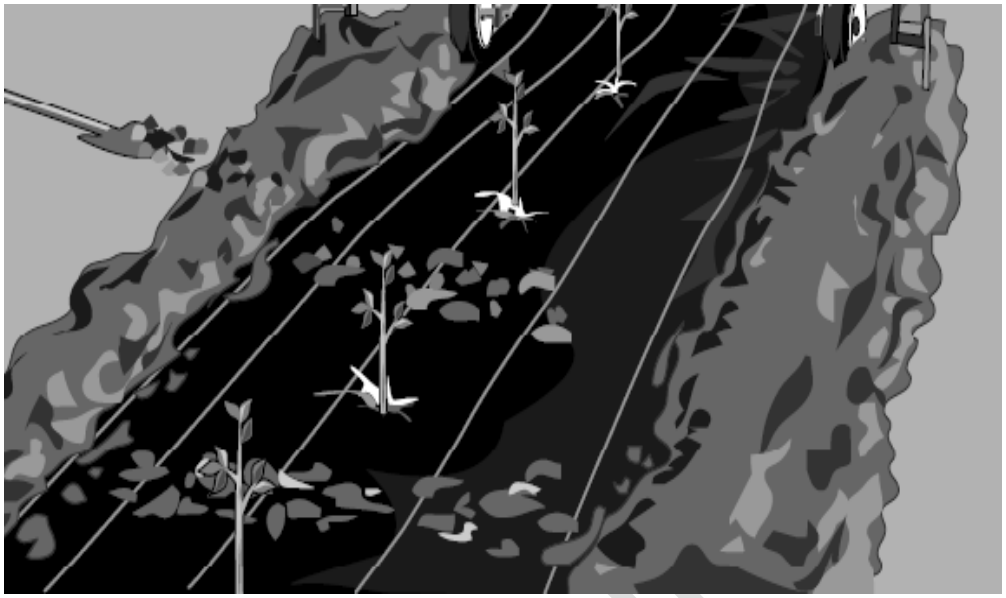
5. 1 Woven Ground Cover

Sr. No.	Description	Specifications
1.	Product	Ground Cover (Mulching)
2.	Size	500 Sq m area for vegetable/ Horticultural crops
3.	Land preparation	Laser leveling or with any precise method soil should be properly leveled. Prepare soil, complete beds, drip irrigation system installation & ground cover application (mulching) before sowing.
4.	Agrotextile material Ground Cover (Mulching)	Woven fabric bio-compatible ground cover of 100 GSM with 1-3m width should be used for weed control. The ground cover should be UV stabilized and should have functional durability of minimum 3 years. The ground cover should conform to the Indian standard IS 16202: 2014 Color: Black / Black x white The ground cover fabrics should be used as per the crops and if required it should be changed for different crops cultivation in next crop cycle.
5.	Creeper / crop support Net (Trellising system)	The Creeper net / crop support net should be used for creeper crops to be cultivated with ground cover and control plot.
6.	Drip irrigation & Fertigation System (with central Automatic control unit)	Drip irrigation system under ground cover need to be selected based on crop spacing. The suggested bill of materials must have Sand Filter, Screen Filter, Control Valves, Bypass Assembly, Air Release Valve, Non-Return Valve, Throttle Valve, Flush Valve, Venturi Injector with manifold, PVC pipes, LDPE plain lateral, emitting pipe, foggers & misters to be fixed w.r.t design. Water tank and fittings & accessories (applicable only BIS standards for all irrigation components as well as water tank).
7.	Sensors	Test plot: Soil Moisture, Soil Temperature, Leaf wetness, Leaf Temperature Control Plot: Soil Moisture, Leaf wetness, Soil Temperature Leaf Temperature

8.	Testing	All Agrotextile materials used in the Demonstration center to be tested by the COE-Agrotech, SASMIRA, Mumbai
Note: An equivalent size Control demo plot to be sown and demonstrated for same crop type in natural conditions for comparative study on the cost benefit analysis of the usage of agrotextiles		

5. 2 Biodegradable Jute Nonwoven / Woven Ground Cover

Sr. No.	Description	Specifications
1.	Product	Biodegradable Nonwoven / woven Jute Ground Cover
2.	Size	500 Sq m area for vegetable/ Horticultural crops
3.	Land preparation	Laser leveling or with any precise method soil should be properly leveled. Prepare soil, complete beds, drip irrigation system installation & ground cover application (mulching) before sowing.
4.	Agrotextile material Ground Cover (Mulching)	Nonwoven / woven fabric ground cover of 300 GSM / 500 GSM with 1-3 m width should be used for weed control. The ground cover should conform to the Indian standards / COE-Agrotech, SASMIRA specified parameters. The ground cover fabrics should be used as per the crops and if required it should be changed for different crops cultivation in next crop cycle.
5.	Creeper / crop support Net (Trellising system)	The Creeper net / crop support net should be used for creeper crops to be cultivated with ground cover and control plot.
6.	Drip irrigation & Fertigation System (with Central Automatic control unit)	Drip irrigation system under ground cover need to be selected based on crop spacing. The suggested bill of materials must have Sand Filter, Screen Filter, Control Valves, Bypass Assembly, Air Release Valve, Non-Return Valve, Throttle Valve, Flush Valve, Venturi Injector with manifold, PVC pipes, LDPE plane lateral, emitting pipe, foggers & misters to be fixed w.r.t design. Water tank and fittings & accessories (applicable only BIS standards for all irrigation components as well as water tank).
7.	Sensors	Test plot: Soil Moisture, Soil Temperature, Leaf wetness, Leaf Temperature Note: The control plot for both ground cover demo plots would be same
8.	Testing	All Agrotextile materials used in the Demonstration center to be tested by the COE-Agrotech, SASMIRA, Mumbai
Note: An equivalent size Control demo plot to be sown and demonstrated for same crop type in natural conditions for comparative study on the cost benefit analysis of the usage of agrotextiles		



Ground Cover

Technical Specifications for Construction of Demonstration Center

6. Crop Cover (Alongwith Ground Cover)

Sr. No.	Description	Specifications
	Product	Crop cover / Frost Cover
	In case of Vegetable Cultivation Low Tunnel will be created or for Load bearing crops like Melons only Crop Cover will be spread on the crop	
1	**Low Tunnels (For Vegetables Cultivation)**	
1.1	Size	500 Sq m area for vegetable/ melon crops with low tunnels
1.2	Material	Pipe material: PVC Pipes, Diameter: 1.5 inch, Length: 10 ft, The low tunnel is built by 1.5inch diameter PVC pipes in half-moon shape. The PVC pipes are put at regular intervals of approximately 3 feet. Each tunnel structure will then be covered by crop cover.
1.3	Height	3.5 ft, half-moon shaped
1.4	Width	0.6 to 1 m
1.5	Length	20 m

1.6	Number of tunnels	20-25
1.7	Land preparation	Soil should be properly leveled. Prepare soil, complete beds, drip irrigation system installation & ground cover application (mulching) before sowing.
1.8	Agrotextile material Crop Cover	Spun bond nonwoven / Warp knitted - Crop Cover fabric GSM: 17 to 30 GSM (As suitable for the type of crops/plants) Width: 3 – 3.5 m The Crop cover should be UV stabilized and should have functional durability of minimum 3 years. In case of spunbond nonwoven fabric, it should be replaced after every crop cycle.
1.9	Agrotextile material Ground Cover (Mulching)	Woven fabric ground cover of 100 GSM with 1-3m width should be used for weed control. The ground cover should be UV stabilized and should have functional durability of minimum 3 years. The ground cover should conform to the Indian standard IS 16202: 2014 Color: Black / Black x white The ground cover fabrics should be used as per the crops and if required it should be changed for different crops cultivation in next crop cycle.
1.10	Drip irrigation & Fertigation System	Drip irrigation system inside ground cover need to be selected based on crop spacing. The suggested bill of materials must have Sand Filter, Screen Filter, Control Valves, Bypass Assembly, Air Release Valve, Non-Return Valve, Throttle Valve, Flush Valve, Venturi Injector with manifold, PVC pipes, LDPE plain lateral, emitting pipe, foggers & misters to be fixed w.r.t design. Water tank and fittings & accessories (applicable only BIS standards for all irrigation components as well as water tank).
1.11	Sensors	Test Plot: Soil Moisture, Soil Temperature, Air Temperature, Leaf Wetness, Leaf Temperature Control Plot: Soil Moisture, Soil Temperature, Leaf wetness, Leaf Temperature
1.12	Testing	All Agrotextile materials used in the Demonstration center to be tested by the COE-Agrotech, SASMIRA, Mumbai
Note: An equivalent size Control demo plot to be sown and demonstrated for same crop type in natural conditions for comparative study on the cost benefit analysis of the usage of agrotextiles		

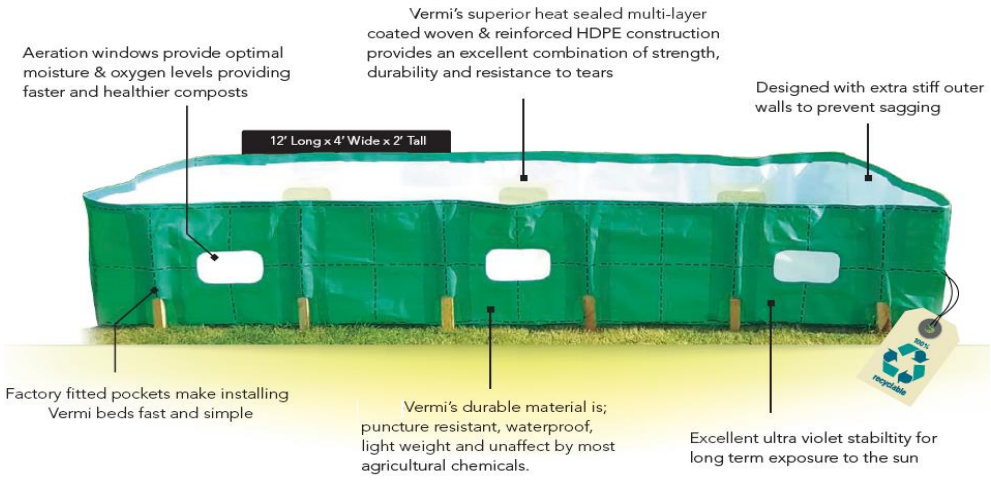
Crop Cover (Low Tunnel)

Technical Specifications for Construction of Demonstration Center

7. Vermicomposting under Shade Net house

Sr. No.	Description	Specifications
1.	Product	Vermicomposting under Shade Net house (Dome shape)
2.	Size	300 Sq. m 10 Vermi Beds should be placed and dimensions should be selected as per the bed sizes and arrangements.
3.	Height	4 m from floor area.
4.	Structural design	The structural design must withstand wind speed of minimum 120-140 km/hr. The aerodynamics shape should be preferred to avoid wind load.
5.	Structure / Material	Complete structure should be made of GI tubular pipes the structural member should be joined with fasteners properly. GI tubular pipes or equivalent section of light class conforming Indian Standards IS: 1161-1998, the structural member should be joined with fasteners properly. Columns: 76 mm OD, 3.2 mm thick Trusses, purlins and hockey: 60 mm OD, 2.9 mm thick

		Member for Truss, purlins & others: 48 mm OD, 2.9 mm thick
6.	Cladding material	UV stabilized shade net having 75 to 90 % shading factor confirming to Indian Standards IS 16008: 2016.
7.	Civil work	Depth of foundation need be kept at 90 cm or more depending upon soil type and prevailing wind conditions. GI pipes conforming to Indian Standards IS: 1161-1998 or equivalent sections should be grouted in cement concrete mixture with 1:2:4 ratios.
8.	Floor	A compact bed foundation with minimum 6 inches slope should be made to place / fix vermibed, in order to provide proper direction for the drainage of vermi-wash.
9.	Agrotextile Material – Vermi Bed	Woven laminated Vermi Beds Vermi Bed Dimensions: 12 x4 x2 ft (LxWxH) Fixing of Vermi Bed: by using GI poles The vermi bed should conform to the Indian standard IS 15907: 2010
10.	Sieving Machine (One)	A motorized Sieving machine is to be used for harvesting. Compost can be separated and sieved for use.
11.	Land preparation	Soil should be properly leveled with any precise method; the open space should be covered with woven fabric mats.
12.	Tool & Equipments	A set of required tools and equipments should be provided for the Vermicomposting
13.	Pit for partial decomposition	A separate pit should be made for partial decomposition of the raw material, shady, Cow dung and chopped/ dried leafy materials
14.	Earth Worms	Suitable species of earth worms in required quantity should be provided to prepare the vermi compost.
15.	Sensors	Moisture- 3 Nos, Manure Temperature -3Nos to be installed in vermi bed, Relative Humidity -1
16.	Testing	All Agrotextile materials used in the demonstration center to be tested by the COE-Agrotech, SASMIRA, Mumbai as per Indian standards.



Vermi- Bed

Vermi-Composting under Shade Net house

Technical Specifications for Construction of Demonstration Center

8. Pond Liner:

Sr. No.	Description	Specifications
1.	Product	Pond liner
2.	Dimensions	**Pond Dimensions 30m X 30m** (May be adjusted as per the soil conditions and ground water level in the land where the pond liner is to be installed) **Pond Depth 6m** (May be adjusted as per the soil conditions and ground water level in the land where the pond liner is to be installed)

		Bottom Dimensions 27m X 27m (May be adjusted as per the slope of the pond structure) Water Level Scale pond including the cost of Labor, Digging, Pond liners cost etc.
3.	Agrotextile Pond liner material	UV stabilized Impermeable woven coated fabric liner with life of minimum 3 years. The pond liner should conform to the Indian standard IS 15351 / IS 7016 having thickness of 0.75 to 1.00 mm and mass of 650 to 950 g/m^2
4.	Fishing Net	Collapsible Pond Net with Extendable Telescoping rod (Handle) to clean debris and sludge.
5.	Surface Cover Net	Pond/Pool Cover Nets Functioning as Bird Protection Nets, which will also help in protection of any falling objects in the pond. It will also restrict the evaporation of the water. The net should have reinforced with selvage cord.
6.	Fencing Net	The pond should be fenced with fencing net of quality as per IS standards. Depth of foundation need be kept at 90 cm or more depending upon soil type and prevailing wind conditions. GI pipes conforming to Indian Standards IS: 1161-1998 or equivalent sections should be grouted in cement concrete mixture with 1:2:4 ratios.
7.	Civil work	Civil work for holding the ends around the pond should be done in cement concrete mixture with 1:2:4 ratios.
8.	Sensors	pH
9.	Testing	All Agrotextile materials used in the shade net house to be tested by the COE-Agrotech, SASMIRA, Mumbai

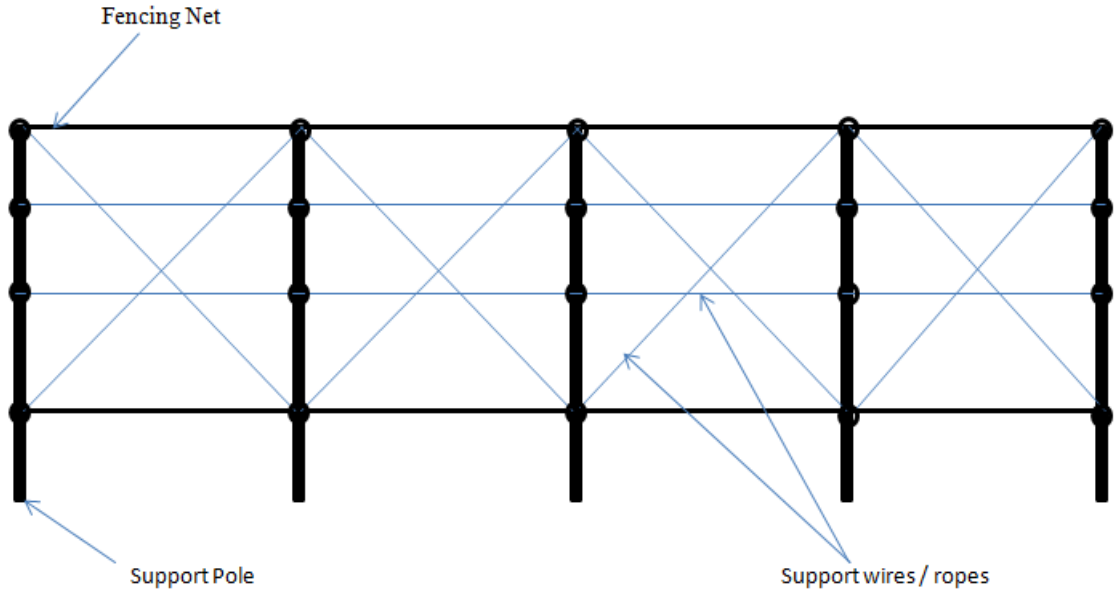
Pond liner

Bidder's Signature and Seal

Technical Specifications for Construction of Demonstration Center

8. Fencing Net

Sr. No.	Description	Specifications
1.	Product	Fencing net
2.	Height	2.5 m above the ground level.
3.	Pole posts Spacing	The pole posts should be paced at 4 m apart.
4.	Agrotextile Fencing net for Outside Border	UV stabilized fencing net having life of minimum 3 years. The outside (border) fencing should have higher strength and thickness of filaments.
5.	Fencing for The Inside Crop Plot	UV stabilized fencing net having life of minimum 3 years. The inside plot fencing should be manufactured from minimum 36 ply ropes and diamond shape.
6.	Civil work	Depth of foundation need be kept at 90 cm or more depending upon soil type and prevailing wind conditions. GI pipes conforming to Indian Standards IS: 1161-1998 or equivalent sections should be grouted in cement concrete mixture with 1:2:4 ratios.
7.	Testing	All Agrotextile materials used in the shade net house to be tested by the COE-Agrotech, SASMIRA, Mumbai



Fencing Net Instllation (Illustration)

Fencing Net (Illustration)

Technical Specifications for Construction of Demonstration Center

9. Internet of Things (IoT) System

Internet of Things (IoT) system would be installed in the Demonstration centre for control and monitoring of the microclimatic conditions. Monitoring, Processing and Analysis of microclimatic data of the following parameters would be recorded and analysed.

Meteorology

Automatic collection and analysis of meteorological data: air temperature, humidity, precipitation, solar radiation, wind speed and direction. Monitoring specific thresholds and triggering alarms.

Water Stress

Automatic detection of water potential (the plant's ability to absorb water from the ground) at different depths, for monitoring, custom configuration of thresholds and activation of alarms.

Thermal Stress

Automatic detection of air and ground temperatures at different depth levels. Monitoring, customized configuration of the relative thresholds and activation of alarms.

Growth

Automatic monitoring of crop, fruit growth through specific devices employed. Analysis of growth in relation to environmental and context parameters (stress situations).

Irrigation

Automatic monitoring of irrigation systems and control of the quantity of water supplied. Definition of specific thresholds and activation of alarms.

DASHBOARD

The Dashboard to display Real-time data monitoring for the following parameters:

- Air temperature
- Humidity
- Precipitation
- Solar radiation
- Wind speed and direction
- Soil temperature
- Soil moisture
- Soil electrical conductivity
- Water delivered through irrigation

IoT System Components

The IoT system would be employed for data collection and regulation of microclimate around the crops in Shade Net Houses, Crop Cover low tunnels, Ground Cover (Mulching) and open field cultivation of crops. The data analysis software for near Real-time data monitoring with predefined data interval and IoT cloud-level analysis for effective maintenance and productivity of plants/crops is to be provided. The technology should be a Low Power Wide Area Network (LPWAN) - Long Range wireless Communication with a frequency range of 865 MHz to 867 MHz approved by TRAI regulations / Medium range large bandwidth communications protocol 4G/5G/LTE approved by TRAI.

Weather Node (Weather Station)

Parameters to be detected	Sensor specifications
Air temperature (°C)	Range: -20°C to 60°C Accuracy: ±0.2 °C or better Resolution: 0.1 °C
Air Humidity (%)	Range: 0 to 100 % RH Accuracy: ±5% or better for RH 0 to 50% ±3% or better for RH >50% Resolution: 1 % RH
Precipitation (mm)	Range: 0.2 to 300 mm/hour Resolution: 0.5 mm or better Collector Area: at least 200 cm^2 Accuracy: ±4% or better, for rain rate between 50mm/ hour to 100 mm/ hour
Solar radiation (W/m^2)	Total Solar Radiation (TSR) Sensor measures real-time solar total radiation from 300 to 2800 nano meters Range: 0-2000 W/m^2 Resolution: 1 W/m^2 Spectral Range: 300-2800nm Accuracy: ± 3% Strong Robustness: It's watertight and dustproof with IP68 Enclosure, and can operate under a wide range of temperatures from -30°C to 75°C
Wind speed (km/h) / m/sec	Range: 0 to 80 m/sec Resolution: 0.1 m/s Accuracy: ±2% OR By Weather API
Wind direction (°N)	Range: 0 to 360 Deg Resolution: 1 Deg Response Time: 2 Sec Accuracy: ± 3° OR By Weather API
UV Radiation Sensor	Range: (LF) 410 ~ 528 Mhz to (HF): 862 ~ 1020 Mhz Accuracy: 0〜5mw/cm^2
Photosynthetically Active Radiation (PAR)	PAR sensor measures real-time photosynthetically active radiation across the radiation range from 400 to 700 nm.

Bidder's Signature and Seal

	Range: 0-4000 µmol/m^2/s Resolution: 0.1 µmol/m^2/s Spectral Range: 300-800 nm Accuracy: ± 2% Measurement interval: 1s Operating Humidity: 0 to 100 %RH (non-condensing) Strong Robustness: It's watertight and dustproof with IP68 Enclosure, and can operate under a wide range of temperatures from -30°C to 75°C
CO_2 Sensor	Range: 0 to 40000 ppm Resolution: 0.1 ppm Accuracy: ± (30 ppm + 3 % of reading)
Power Supply	Solar Panel and easily replaceable Battery (Battery life: 5-8 years)
Sensor Performance (Required for all sensors)	High accuracy, reliability, and stability. Support wireless OTA update via Bluetooth. Industrial-grade Robustness: IP66 rated, suitable for long-term applications. IP66 Certified. Strong Anti-interference: made of flame-retardant epoxy resin. High Durability: anti-corrosion, with excellent performance for long-term use. IP66 rate waterproof Enclosure for the Controller Devices
Cable Length	As per the requirement for installation design in the agrotextile protected structures and open field cultivation to cover the required distance of gateway / control units.

LAND NODE

Parameters to be detected:	**Sensor specifications**
Soil temperature (°C)	Range: -30 ~80°C Resolution: 0.1°C Accuracy: ±0.20 °C or better
Soil Moisture (%)	Range: 0 to 100% VWC Resolution: 0.1 VWC Accuracy: ± 3%
Electrical conductivity (uS/cm) or (ms/cm)	Range: 0~20000 us/cm Accuracy: ±5% Resolution: ±5% in 10000-20000 us/cm range
Water Meter	Flow range: 0.3 to 10 m/sec Accuracy: ± 0.5% Repeatability: ± 0.1%

	Woltman type Water Meter (Cold) Body Material cum Standard - Brass IS-210 Gr. FG-200 Water Meter Protection Class - IP68 CI T type Strainer with Flanged end and SS Mesh Dial Details - Magnetic Drive, Extra Dry Dial
pH (pH)	Range 0-14 pH Accuracy ±0.01 pH Resolution 0.01 pH Operating Temperature: -40 ~ 85°C IP68 rate for the Sensor Probe IP66 rate waterproof Enclosure for the Controller Devices
Evaporation	PAN Dia: 1200mm Range: 0-100 m/day Resolution: 1mm Accuracy: ±1%
CO_2 Sensors	Range: 400 to 10000 ppm Accuracy: ± (30 ppm +3% of reading) Resolution: 1 ppm
Power Supply	Solar Panel and easily replaceable Battery (Battery life: 5-8 years)
Sensor Performance (Required for all sensors)	High accuracy, reliability, and stability. Support wireless OTA update via Bluetooth. Industrial-grade Robustness: IP66 rated, suitable for long-term applications. IP66 Certified. Strong Anti-interference: made of flame-retardant epoxy resin. High Durability: anti-corrosion, with excellent performance for long-term use. Downlink to change configure
Cable Length	As per the requirement for installation design in the agrotextile protected structures and open field cultivation to cover the required distance of gateway / control units.

IoT Enabled Soil Testing Kit

Should be capable to analyze soil and its contents. It should measure major soil nutrients (N, P, K), macro- nutrients (Fe, Zn, S, B, Cu), EC& PH levels etc. It should have digitized soil testing process. The minimum technical parameters should include: Processor - 8/32 bit – MCU, Display Interface – Bluetooth, Housing: Stainless steel framework with Aluminium cover, Cloud Connect: Wi-fi/ GPRS. The consumables required for soil testing during the 3 years of demonstration period needs to be included.

Bidder's Signature and Seal

CROP / PLANT NODE

Parameters to be detected:	Sensor specifications
Leaf Temperature	Range: -40 to 80° C Accuracy: ±0. 5℃ Resolution: 0.1 ℃
Leaf Wetness	Range: 0~100% Resolution: ±5% Accuracy: 0.01 % IP66 Waterproof Enclosure IP67 rate for the Sensor Probe
UV Radiation Sensor	Range: (LF) 410 ~ 528 Mhz to (HF): 862 ~ 1020 Mhz Accuracy: 0〜5mw/cm²
Power Supply	Solar Panel and easily replaceable Battery (Battery life: 5-8 years)
Sensor Performance	High accuracy, reliability, and stability. Support wireless OTA update via Bluetooth. Industrial-grade Robustness: IP66 rated, suitable for long-term applications. IP66 Certified. Strong Anti-interference: made of flame-retardant epoxy resin. High Durability: anti-corrosion, with excellent performance for long-term use. Downlink to change configure
Cable Length	As per the requirement for installation design in the agrotextile protected structures and open field cultivation to cover the required distance of gateway / control units.

Handheld Tools/ Equipments

The bidders have to provide the following post-harvest tools / equipments and packaging materials for measuring the harvested produce quality and quantity.

Sr. No.	Particulars	Quantity	Specifications
1	Portable Spectrometer	1	Measurement Range: 0.5 to 1,000 W/m^2 Illuminance Accuracy: ± 5% Wavelength Range: 380 to 780 nms Wavelength Data Increment: 1 nm

Bidder's Signature and Seal

2	Weighing balance	1	Capacity: 100 Kg Accuracy: 50 gm Fully SS 304 with SS Indicator Overload & shock load protection Indicator housed in a sturdy metal enclosure Bright LED display Rechargeable sealed maintenance free battery
3	Fruit Firmness Tester	1	Measuring Capacity: 20 Kgf x 0.01 Kgf (10 gf). Tip size: 3 mm, 6 mm, 8 mm, 11 mm. Accuracy: ± (0.5 % + 2 digits) Operating Temperature: 0 ~ 50°C Transducer type: Load Cell
4	Electronic Fruit Size Measurement	1	Measuring range: 10 - 100 mm diameter Measuring resolution: 1.00 mm Measuring unit: millimeter & inch
5	Greenseeker	1	Dimensions: 3.5” x 10.5” (9 cm x 27 cm) Field of View: 10” at 24”, 20” at 48” Operating Height: 24” – 48” Operating Temperature: 10 °C - 50 °C
6	Handheld Photosynthesis System	1	Lens: On board IRGA for CO_2 Analysis, H_2O Analysis with humidity sensor capacitor, Flow Control, Pump, Display and Key Board, Leaf Chamber attachment ports and Battery. Flow Rate: 100~1000 cm^3/min Operating Temperature: 0-45 °C Operating RH: 0-90% non-condensing

Hardware systems

The Internet of Things (IoT) system should include the hardware essential to function smoothly, control real-time data collected by different sensors, process the data, convey to the control systems to monitor the microclimate and display the data on the dashboards.

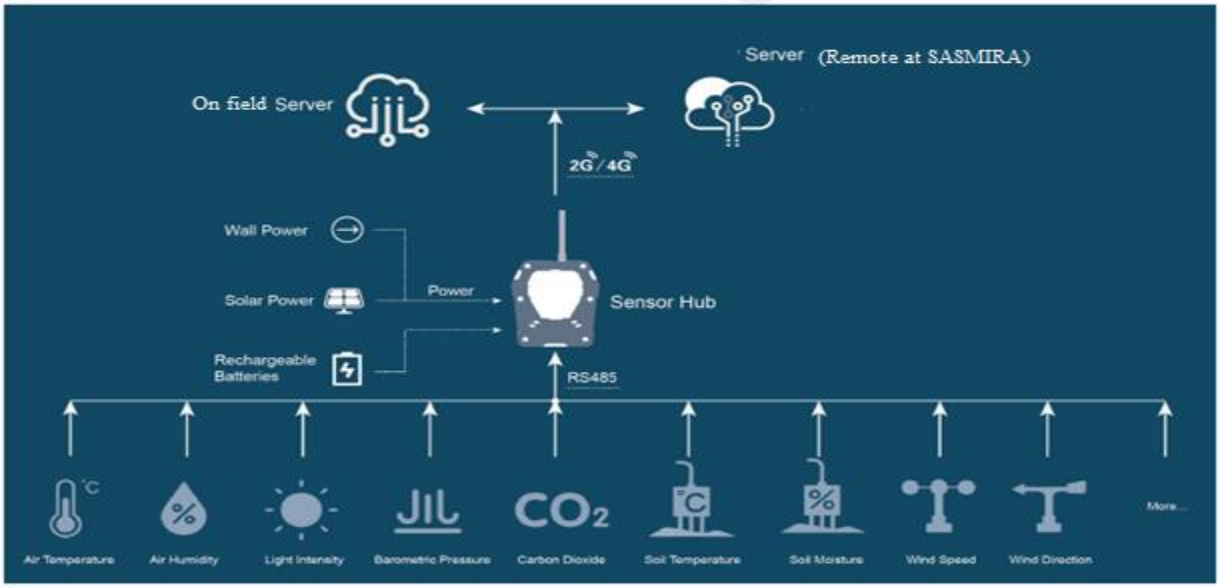
The hardware and software required in monitoring the functioning of the sensors and data processing to ultimately provide optimum / desired conducive microclimate to the crops needs to be included by the suppliers, even it has not been mentioned / written explicitly in the tender document as compatibility of hardware with particular software may vary from supplier to supplier. Therefore, the supplier / bidder shall include all such hardware and software requirements its bid as per compatibility of his software and hardware system to be quoted.

Bidder’s Signature and Seal

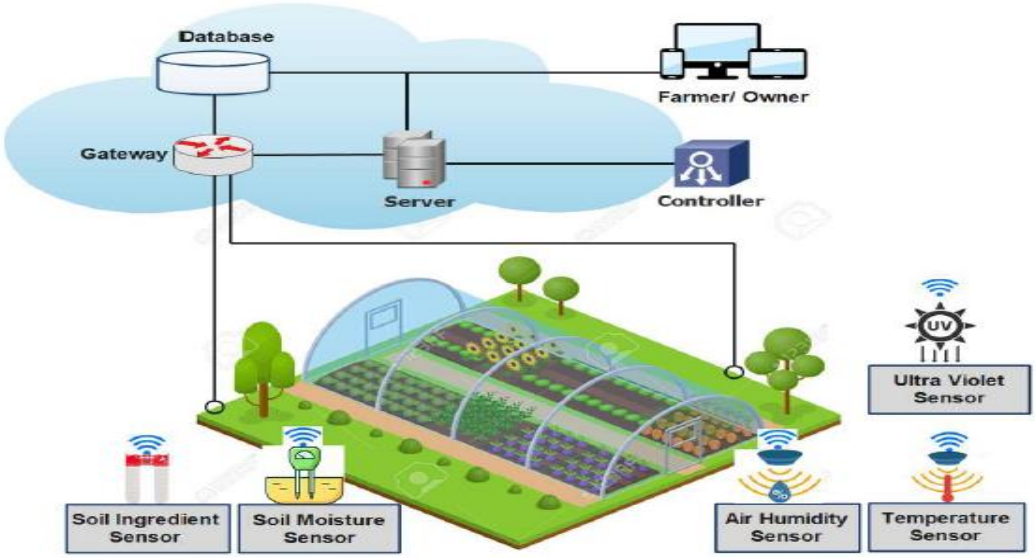
Hardware	Specifications
Data Acquisition System (DAS) or Data Logger	• A data acquisition system (DAS) or Data Logger shall provide a means to for collecting, logging and transmitting the data in a secure, reliable and efficient manner, while maintaining the availability, confidentiality and integrity of the data. • The data logger shall read data from a sensor, and store in an encrypted format for data security and to prevent unauthorized access to the data. • It should have adequate number of analogue & digital channels and sufficient number of communication ports. • The DAS system should be capable for Both web and Mobile platform to visualize sensor data and corresponding advisory. The platform majorly should offer following features: - o An overview of plot details, crops grown, and sensors data etc. o Device and Sensor performance tracking o Alerts customization and accuracy tracking o Hourly, Weekly, and Monthly downloadable reports
Data Logger Specifications	• 5 (0-3.3V) analog input (12-bit resolution) • 2 digital inputs • 8GB data storage capacity • IP65 (NEMA 4) enclosure • Operating 0°C to +60 °C, 0% to 100% RH • Material: UV stabilized ABS Plastic • SMA-M antenna connector (50 Ohm) • Push insert-SIM card bay • PV input 12V • Lithium-ion power backup battery (4000mAH)
IoT Network & Application Software	**Specification & Features:** • Integrated IoT Network and localized data storage with network management and application handling. • Web Application and Android Mobile Application • Subscription / license for data storage PC • Multiple User login • Supported a Wide range of Technologies for IoT devices like MQTT, HTTP etc. • Long-Range IoT Device Class Support: Class A & Class C • Long-Range IoT Activation Method Support: ABP & OTAA • Multi-channel notifications (SMS, App, E-Mail etc.) for efficient critical information dissemination. • Versatile data export (Excel, CSV/ PDF) for seamless data use across business processes.

Bidder's Signature and Seal

	• Real-time device monitoring and control through intuitive dashboards. • Option to provide manual override Downlink to end devices based on user decisions. • Proactive gateway status alerts for quick responsiveness to changes. • Communication failure alerts for proactive intervention and maintenance. • Application Specific data analytics dashboards for informed specific decision-making. • Fine-grained user management with roles and permissions for secure tailored access.
Computer System	Intel Core i7, 14th Generation Processor / better / latest version, Gigabyte B760M D2H DDR4 Motherboard, 16GB DDR4Kingston /Cruical RAM, 2TB SSD NVMe Kingston/ Cruical, Dell Wired Keyboard Mouse, 22" LED Monitor E2223HN, Mini Tower Casing with SMPS (Circle/ Artis), MS Win 11 Professional 64 Bit OS License / latest available at the time of supply, MS Office Home & business 2021 License with outlook. Two computer system should be provided. Printer with scan and xerox facility needs to be provided.
Display Unit	Indoor Wall Mount Smart Display Unit • Dynamic Crystal Color 138cm (55") Crystal 4K Ultra HD & 3840 x 2160 Pixels or higher • Sleek and slim design • Crystal Processor 4K Feel every shade of color as intended in powerful 4K or equivalent
Power Supply	• The entire AWS/Agri IoT device shall work on solar and battery power. The system should be self-sustained, with fully solar power operated system with solar panels (up to 5 watt) and battery bank (at least 4000mAH) • The battery must be maintenance free & it must be of such a capacity that the system shall run uninterrupted even in completely cloudy weather for at least 15 days. • The solar panel should be of adequate ratings to charge the battery during sun.



System Architecture



An illustration of IoT application for monitoring farming conditions in a Shade net house

Central Auto Irrigation and Fertigation

To Plan and monitor irrigation schedule from one dashboard with all the key measures for optimal water management a central irrigation system to be installed for all the trial plots.

- Water and Fertilizer Integrated machine composed of IoT Cloud Platform, data acquisition terminal, Fertilizer applicator, Filtration System, Valve Controller, Valve, Field Pipeline, and other parts.
- Automatic control of the amount of Irrigation, and Fertilization by automated control Valves for the Irrigation and Fertigation System
- Four channel Fertigation system that helps to do Precise Irrigation and Fertigation processes
- High-Quality chemical grade, Pressure resistance, and Corrosion resistant pipes
- Industrial-grade High-Pressure Stainless Steel Booster Pumps
- Intelligent Motor Control with constant pressure throughout the drip systems
- Smooth motor Start for stable operation
- Multiple Control modes and automatic voltage stabilization
- Frequency Conversion Speed Control Circuit protection
- Separate 500L Automatic Fertilizer Mixing tank with Industrial Stirring motor and SS304 Stirring rod (Chemical Grade) for each channel
- The Electromagnetic Valve with Pole, Controller Panel, Solar and Battery
- Automatic backwash laminated filter
- Sand and gravel backwash filter
- Centrifugal filter with mesh filter
- Fertigation and Irrigation Valves with Manual Override option
- Separate 100L Automatic pesticide mixing tank with Industrial Stirring motor and SS304 Stirring rod (Chemical Grade) for each channel
- Compact Industrial-grade Robustness: IP65 rated, suitable for long-term applications.

Irrigation Control System	PLC Controller 32 station Irrigation Controller 16 Output extension unit Communication adapter
Fertigation System	Auto Control precise nutrition management of crops in open field, Net house as well as for Nurseries Equipped with EC & pH Electrodes Monitors Equipped with highly reliable EC & pH electrodes monitors Electrically Operated Venturi for Dynamic Control of Nutrition's and Acid Additional Pressure Relief Valve Adjustable Flow Meters To adjust injection rate special flow meters (Rota Meters) provided to each Venturies (EC/pH transmitter and 500 LPH of 4

	fertilizer injector and 1 acid injector of 500 LPH –Minimum capacity)
Field Valves & Water meter	Water Meter 2.5" Hydraulic Valves 2" Solenoid Pilot Valves 24 VAC J-Super Flow 3m³/hr 25mm (3/4) Disc Clean 3/4" Fertilizer counters
Water pumps	3 / 5 HP capacity pumps should be used for the irrigation of the demo centre. The horse power of the pump is to be selected based on the total load of irrigation required to irrigate the complete the area of the demonstration centre.
Electricals & Accessories	All electrical connectors and accessories need to be included as per the requirements of the complete system to work properly.
Control System	Computer/ Laptop with required configuration for control system needs to be installed.
Note: The complete automization system should work for the entire Demo centre models of Shade net houses, crop cover, ground cover, nursery, pond including the open fields of the agrotextile structures.	

Solar Pumping system for Drip Irrigation

Sl. No.	Item Description
1	Solar Module: Supply , transport , installation and commissioning of ISI marked as per IS 14286 and IEC 61853(1), 61730(1&2), 61710 certified Solar Module of Multi-crystalline / Monocrystalline/ Monocrystalline PERC/ bifacial cell with min. efficiency of 15% and fill factor more than 70%, laminated between sheet of -Ethylene Vinyl Acetate (EVA) and high transmissivity 3.2/4.0 mm tempered glass , framed in anodized aluminium frame .The power output of individual PV modules used in the PV array, under STC, should be a minimum of 300 Watt peak, with adequate provision for measurement tolerances. Modules supplied with the SPV system should have warranty for output wattage, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years. Necessary test certificate also to be supplied. For 3 / 5 HP Off-grid Solar Water Pumping System with Multi-crystalline SPV modules - 5525 Wp. The horse power of the pump is to be selected based on the total load of irrigation required to irrigate the complete the area of the demonstration centre.

2	**Module Mounting Structure** (For 5 HP Solar Water Pumping System): Supply, transportation & installation of G.I manual tracking structure made of MS hollow sections, pipes, plates, angles etc as per IS 1161/1239, 1079/2062, to hold min 300 Wp SPV Module as per drawing and specification of MNRE. The steel structure is to be protected with minimum 80-micron galvanisation (hot dip) and provided with dual axis manual tracking arrangement three times in a day and seasonal tilting are to be regulated to face the sun optimally. The weight of the Module Mounting Structure holding 4 Modules should not be less than 195Kgs, holding 6 Modules should not be less than 210 Kg and holding 8 Modules should not be less than 245 Kg. (250 Kg for 8 module structure)
3	Foundation of Module Mounting Structure: Suitable and stable Reinforced Cement Concrete foundation for dual axis manual tracking SPV Module structure a) For 8 module structure.
4	Power conditioning unit with IP65 enclosure: Supply, transport, installation and commissioning of IP 65 protected enclosure. Inverter Unit qualifying IEC 61683-Efficiency measurement and IEC 60068-2-Environment Standard, safety standard suitable for 3 Phase A.C. motor, IGBT based high voltage switching inverter with MPPT technology, to take care of the variation of Sun light and will be suitably mounted inside the metal enclosure. Inverter should have protection against Dry run, over current, Under current, Over voltage, Under voltage, short circuit etc. System should be able to run at low sunshine and minimum 7 to 8 hours a day run should be possible during normal sunshine. Condition. Inverter should have option to auto start for any short trip off due to low light/ cloudy situation except for dry run. Inverter should be provided with a display to show the various parameter by the user such as Voltage, Current, Solar panel DC voltage, Inverter IGBT temperature, Output AC voltage, Output frequency, Pump flow (direct or calculated method), Irradiation etc. The system should store the data at a set interval, be capable to transfer it to external storage device and support communication of its operational parameters and logs over Modbus protocol. It should also monitor and save total run time, total water pumped etc. There should be provision for interfacing GPRS based data transmission. For 5 HP capacity Pump-motor set
5	Cable and Accessories: Supplying, fitting and fixings of UV rated Copper Cable laid inside HDPE conduit and other accessories as per followings with necessary connection with the Solar PV Module, MPPT etc. i. 4.0 Sq mm single core multi studs – (for 3 / 5 HP) ii. Lugs, HDPE Pipe, Flexible Pipe, Saddle, Cable tie etc

6	Earthing: Earthing with 50 mm Dia. GI pipe 3.64 mm thick x 3.04 Mts. long and 1 x 4 SWG GI (Hot Dip) wire (4 Mts. long), 13 mm Dia. x 80 mm long GI bolts, double nuts, double washers incl. S & F 15 mm Dia. GI pipe protection (1 Mts. long) to be filled with bitumen partly under the ground level and partly above ground level driven to an average depth of 3.65 Mts. below the ground level as below: By ISI-Medium GI pipe including excavation of soil for installation of Earth Electrode and filling & ramming and connecting to individual structure to earth electrode including S&F 20 mm x 3 mm galvanised (Hot Dip) MS flat on wall/floor with GI saddles as required and connection to equipments incl. drilling holes, with bolts, nuts, washers etc.
7	Connecting the equipments to earth busbar including S & F GI (Hot Dip) wire of 8 swg on wall/floor with staples buried inside wall/floor as required and making connection to equipments with bolts, nuts, washers, cable lugs etc. as required and mending good damages.
8	Supply and installation of 3 phase electromotor pump-motor set suitable for Solar operation covering 5 years warranty for the following conditions including loading, unloading, transportation etc.:- c) 3 / 5 HP ISI marked 3 phase 415 V Pump-Motor set having discharge at required head as below:- i) Monoblock Surface Pump-motor set ISI marked as per IS: 9079 for mini RLI scheme with discharge of 13.8 Lps at 18 mts. total head with 100/80 mm dia. reinforced PVC suction pipe and delivery pipe, foot valve, nipple, priming bend Cable and all other required accessories to complete connection of suction and delivery side .
9	Earthwork in excavation of field trenches as per designed section & alignment for laying of pipe lines (PVC, RCC, ACP etc.) upto a depth of 1500 mm in all sorts of soil including removing, spreading or stacking extra earth as directed. The item includes necessary trimming the sides of trenches, levelling, dressing and ramming the bottom as required complete.
10	Ordinary Cement Concrete (mix 1:2:4) with graded stone chips (20 mm nominal size) excluding shuttering and reinforcement if any, in ground floor as per relevant IS Codes.
11	Earth work in filling in trenches after laying pipe lines (PVC, RCC, ACP etc.) with good earth obtained from excavation of field trenches in layer not exceeding 225 mm, including watering & ramming etc. layer by layer complete.

12	Supply fitting and fixing of Hot dip Galvanised (min 80 micron) / Powder Coat painted / Galvanised M.S Kiosk Box of 80 0(L) X 500(W) X 650(H) and total height with legs is 950mm (above ground) including foundation (as per drawing) for mounting of motor-pump set including transportation, - For 3 / 5 HP surface pump.

Control Room

The bidder has to make arrangements for a control room for housing the control systems, computers and a dashboard display at the demonstration site. The control room should be prepared with composite panels having weatherproof properties to withstand the weather conditions during its life cycle. It should be insulated to maintain the operational conditions for the equipments installed in the control room. The control room should be provided with UPS / inverter battery for continuous supply of power.

Internal Walk-way

The supplier has to prepare internal walk-way between the agrotextile module as well as control plots. A main walk-way of a width of around 3 m need to be prepared at the centre of the demo centre alongwith the length and sub walk-ways of around 1.5 to 2 m width in between each module for inter crop activities and demonstration to the trainees during the physical training at the demonstration centre. A proper fencing and beautification / landscaping with irrigation and solar lighting along the walkways should be done by the vendor.

Annexure-3

STATE WISE PRICE OFFER FOR DIFFERENT TYPE AND SIZE OF STRUCTURES

Tender Notice No.:

To:
Senior Director
COE-Agrotech, SASMIRA
Sasmira Marg, Worli,
Mumbai - 400030

Dear Sir,

I/ We hereby offer best price for establishment/construction of demonstration center of Agrotextile products, Shade Net houses, Ground Cover, Crop Cover, Vertical farming structures, Vermicomposting Bed, Fencing nets, pond liner, Fogger & Misting system, fertigation system, Irrigation system, and GI system as per the Terms of Reference given in this tender Document. The rates are quoted in the prescribed format given below:

1. Net House with PAR Perfect and Diffused Shade-net

Sr. No.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Shade Net house					
1.1	Size of Structure	500 sqm				
1.2	Structure					
1.2.1	Raw Material – Agrotextiles	PAR Perfect and Diffused Shade net, Ground cover				
1.2.2	Raw Material – Mechanical	GI pipes, columns, trusses, Purlin etc.				
1.2.3	Installation cost	Charges for installation				
1.3	Land preparation Charges	Land preparation for sowing in each crop cycle (Minimum 8 crop cycles) for crops under agrotextile models as well as in control plot				

Bidder's Signature and Seal

1.4	Drip Irrigation & Fertigation pipes / laterals connecting the central unit	for crops under agrotextile models as well as in control plot				
1.5	Fogger & Misting system	for crops under agrotextile models as well as in control plot				
2	Agronomical services	Bidder is to provide all agronomical services during the project implementation period (3 Years)				
2.1	Seeds and seedlings @ 8 crop cycles in 3 years	for crops under agrotextile models as well as in control plot				
2.2	Manures, Fertilizers and pesticides	for crops under agrotextile models as well as in control plot				
2.3	Post harvesting storage, Grading & packaging arrangements	for crops under agrotextile models as well as in control plot				
3	Maintenance & Service costs for 3 years					
4	Any other cost (please specify)					
		Total				

Bidder's Signature and Seal

2. Vertical Farming under Shade-net

Sr. No.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Shade Net house					
1.1	Size of Structure	500sq m				
1.2	Structure					
1.2.1	Raw Material – Agrotextiles	Shade Net (shade net, Ground cover)				
1.2.2	Raw Material – Mechanical	GI pipes, columns, trusses, Purlin etc.				
1.2.3	Installation cost	Charges for installation				
1.3	Vertical Farming - A-Shape planting system	Charges for growing Troughs, beams, tiers etc.				
1.4	Soil Media preparation Charges	Land preparation for sowing in each crop cycle (Minimum 8 crop cycles) for crops under agrotextile models as well as in control plot				
1.5	Drip Irrigation & Fertigation pipes / laterals connecting the central unit	for crops under agrotextile models as well as in control plot				
1.6	Fogger & Misting system	for crops under agrotextile models as well as in control plot				
2	Agronomical services	Bidder is to provide all agronomical services during the project implementation period (3 Years)				

Bidder's Signature and Seal

2.1	Seeds and seedlings @ 8 crop cycles in 3 years	for crops under agrotextile models as well as in control plot				
2.2	Manures, Fertilizers and pesticides	for crops under agrotextile models as well as in control plot				
2.3	Post harvesting storage, Grading & packaging arrangements	for crops under agrotextile models as well as in control plot				
3	Maintenance & Service costs for 3 years					
4	Any other cost (please specify)					
		Total				

3. Photo-selective Shade-net House & Crop Support Net/Rope

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Shade Net house					
1.1	Size of Structure	500sq m				
1.2	Structure					
1.2.1	Raw Material – Agrotextiles	Photo-selective Shade Net, Crop support net, Ground Cover				
1.2.2	Raw Material – Mechanical	GI pipes, columns, trusses, Purlin etc.				
1.2.3	Installation cost	Charges for installation				
1.3	Land preparation Charges	Land preparation for sowing in each crop cycle (Minimum 8 crop cycles) for crops under agrotextile				

		models as well as in control plot				
1.4	Drip Irrigation & Fertigation pipes / laterals connecting the central unit	for crops under agrotextile models as well as in control plot				
1.5	Fogger & Misting system	for crops under agrotextile models as well as in control plot				
2	Agronomical services	Bidder is to provide all agronomical services during the project implementation period (3 Years)				
2.1	Seeds and seedlings @ 8 crop cycles in 3 years	for crops under agrotextile models as well as in control plot				
2.2	Manures, Fertilizers and pesticides	for crops under agrotextile models as well as in control plot				
2.3	Post harvesting storage, Grading & packaging arrangements	for crops under agrotextile models as well as in control plot				
3	Maintenance & Service costs for 3 years					
4	Any other cost (please specify)					
		Total				

Bidder's Signature and Seal

4. Medicinal Plant Nursery under Shade-net

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Shade Net house					
1.1	Size of Structure	300sq m				
1.2	Structure					
1.2.1	Raw Material – Agro textiles	Shade Net, Ground Cover, Sapling bags				
1.2.2	Raw Material – Mechanical	GI pipes, columns, trusses, Purlin etc.				
1.2.3	Installation cost	Charges for installation				
1.3	Soil Media preparation Charges	Soil Media / coco-peat preparation for sowing and growing in seedlings				
1.4	Irrigation & Fertigation pipes / laterals connecting the central unit	for seedlings grown under the shade net nursery				
2	Agronomical services	Bidder is to provide all agronomical services during the project implementation period (3 Years)				
2.1	Seeds / cuttings / grafting for seedlings	for crops under agrotextile products				
2.2	Manures, Fertilizers and pesticides	for seedlings grown under agrotextile models				
3	Maintenance & Service costs for 3 years					
4	Any other cost (please specify)					
		Total				

Bidder's Signature and Seal

5. Biodegradable/Compostable Ground Cover & Creeper Net

5.1 Woven Ground Cover

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Ground Cover					
1.1	Total Area of Structure	500sq m				
1.2	Structure					
1.2.1	Raw Material – Agro textiles	Ground cover, Creeper Net (along with installation mechanism)				
1.2.2	Raw Material – Mechanical	Pegs and twine for fixing of the Ground cover				
1.2.3	Installation cost	Charges for installation				
1.3	Land preparation Charges	Land preparation for sowing in each crop cycle for crops under agrotextile models as well as in control plot				
1.4	Drip Irrigation & Fertigation pipes / laterals connecting the central unit	for crops under agrotextile models as well as in control plot				
2	Agronomical services	for crops under agrotextile models as well as in control plot				
2.1	Seeds and seedlings @ 8 crop cycles in 3 years	for crops under agrotextile models as well as in control plot				

2.2	Manures, Fertilizers and pesticides	for crops under agrotextile models as well as in control plot				
2.3	Post harvesting storage, Grading & packaging arrangements	for crops under agrotextile models as well as in control plot				
3	Maintenance & Service cost for 3 years					
4	Any other cost (please specify)					
		Total				

5. 2 Biodegradable Jute Nonwoven / Woven Ground Cover

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Ground Cover					
1.1	Total Area of Structure	500sq m				
1.2	Structure					
1.2.1	Raw Material – Agrotextiles	Nonwoven Jute Ground cover, creeper net (along with installation mechanism)				
1.2.2	Raw Material – Mechanical	Pegs and twine for fixing of the Ground cover				
1.2.3	Installation cost	Charges for installation				
1.3	Land preparation Charges	Land preparation for sowing in each crop cycle for crops under agrotextile models as well as in control plot				
1.4	Drip Irrigation & Fertigation pipes /	for crops under agrotextile				

Bidder's Signature and Seal

	laterals connecting the central unit	models as well as in control plot				
2	Agronomical services	for crops under agrotextile models as well as in control plot				
2.1	Seeds and seedlings @ 8 crop cycles in 3 years	for crops under agrotextile models as well as in control plot				
2.2	Manures, Fertilizers and pesticides	for crops under agrotextile models as well as in control plot				
2.3	Post harvesting storage, Grading & packaging arrangements	for crops under agrotextile models as well as in control plot				
3	Maintenance & Service cost for 3 years					
4	Any other cost (please specify)					
		Total				

6. Crop Cover (Alongwith Ground Cover)

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	**Crop Cover (Low Tunnel)**					
1.1	Total Area of Structure	500sq m				
1.2	Structure					
1.2.1	Raw Material – Agrotextiles	Crop Cover, Ground Cover (along with installation mechanism)				
1.2.2	Raw Material – Mechanical	PVC pipes, required joint materials etc.				

Bidder's Signature and Seal

1.2.3	Installation cost	Charges for installation				
1.3	Land preparation Charges	Land preparation for sowing in each crop cycle for crops under agrotextile models as well as in control plot				
1.4	Drip Irrigation & Fertigation pipes / laterals connecting the central unit	for crops under agrotextile models as well as in control plot				
2	Agronomical services	for crops under agrotextile models as well as in control plot				
2.1	Seeds and seedlings @ 8 crop cycles in 3 years	for crops under agrotextile models as well as in control plot				
2.2	Manures, Fertilizers and pesticides	for crops under agrotextile models as well as in control plot				
2.3	Post harvesting storage, Grading & packaging arrangements	for crops under agrotextile models as well as in control plot				
3	Maintenance & Service cost for 3 years					
4	Any other cost (please specify)					
		Total				

7. Vermicomposting under Shade Net house

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Vermicomposting under Shade Net house					
1.1	Size of Structure	300sq m				
1.2	Structure					
1.2.1	Raw Material – Agrotextiles	Shade Net along with installation mechanism				
1.2.2	Raw Material – Agrotextiles	10 Vermi Beds of the size 12x4x2ft (LxWxH) Number of Layers: 7				
1.2.3	Raw Material – Mechanical	GI pipes, columns, trusses, Purlin etc.				
1.2.4	Installation cost	Charges for installation				
1.3	Land preparation Charges	Land preparation for installation of beds				
1.4	Tool & Equipments (Sieving m/c)					
1.5	Worms					
1.6	Manures waste & other additives					
1.7	Post harvesting storage, & packaging arrangements					
2	Maintenance & Service cost for 3 years					
3	Any other cost (please specify)					
		Total				

Bidder's Signature and Seal

8. Pond-liner

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Pond Liner for water conservation					
1.1	Size of Structure	Pond Dimensions 30m X 30m Pond Depth 6m Bottom Dimensions 27m X 27m				
1.2	Structure					
1.2.1	Raw Material – Agrotextiles	Pond liner: Geo Membrane/ Woven coated impermeable fabric				
1.2.2	Structure preparation	Preparation of pond, Fencing net for safety around the pond				
1.2.3	Installation cost	Charges for installation				
1.3	Any other cost (please specify)					
		Total				

9. Fencing Net

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Fencing Net around the Demo Centre boarders					
1.1	Raw Material – Agro textiles	Fencing net for the outer borders. Fencing nets along the internal walk way / individual plots				
1.2	Raw Material – Mechanical	GI pipes, columns, Twines, wires, binding wires, fixers etc.				

Bidder's Signature and Seal

2	Installation cost	Charges for installation				
3	Any other cost (please specify)					
		Total				

10. Internet of Things (IoT) System

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Internet of Things (IoT) system					
1.1	IoT Hardware	Datalogger / Gateway, Modbus, network controllers, A networking system for controlling and receiving the inputs from the sensors and processing the data				
1.2	IoT Network & Application Software	Integrated Network and Application Server with unified network management and application handling.				
1.3	Data Storage and processing system	A data processing system to be installed at sasmira for control and data analysis				
2	Display unit	The control room display unit to display different parameters				
3	Sensors	Quotation for all required Sensors				
4	Installation cost	Charges for installation				
5	Any other cost (please specify)					
		Total				

11. Central Auto Irrigation and Fertigation

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
1	Central Auto Irrigation and Fertigation system					
1.1	Central Control Unit	A control unit enabled with IoT system to control the irrigation and fertigation automatically in each demo plot.				
1.2	IoT Network & Application Software	An integrated software for automatic irrigation and fertigation control needs to be provided				
2	Components of irrigation & fertigation system	The components like sand filters, filters, venturi, connectors, mains, sub-mains etc.				
3	Installation cost	Charges for installation				
4	Any other cost (please specify)					
		Total				

12. Solar Pumping system for Drip Irrigation

Sr.	Particular		Qty.	Unit	Rate (Rs.)	Total Consolidated Price in Rs
	Solar Pumping system for Drip Irrigation					
1	Solar pump	Pumping motors and accessories				
2	Solar Panels	Solar panels and accessories				

Bidder's Signature and Seal

3	Installation cost	Charges for installation				
4	Any other cost (please specify)					
		Total				

Note:

- The price offer quoted is inclusive of all taxes.
- The price offer is inclusive of cost of material, foundation, civil work, fabrication, installation, commissioning, transportation, labour and miscellaneous expenditure upto project completion (3 years).
- The power, water required other than specified in this document are to be provided by demo site owner.

Authorized Signatory with Seal

Annexure – 4

PROFORMA OF GENERAL POWER OF ATTORNEY

(To be signed and executed on non- judicial Stamp Paper of Rs. 100/-)

Be it known all to whom it concerns that:

1. Shri/Smt_____ S/O_____ Residing

at_____

2. Shri/Smt_____ S/O_____ Residing

at_____

3. Shri/Smt_____S/O_____ Residing

at_____

I/ We all the Partners/ Directors/ Board members/ trustees/ Executive council members/ Leaders of M/S _____having its registered office at _____ hereby appoint Sri _____ S/O _____ residing at _____ as my/our attorney to act my/our name and on behalf and sign and execute all Documents/ Agreements binding the firm for all contractual obligations (including reference of cases to arbitrators) arising out of contracts to be entered into by the company/ Corporation/ society/ trust/ firm with the COE-Agrotech, SASMIRA (Authority), Sasmira Marg, Worli, Mumbai- 400 030 in connection with its tender no. _____dated _____ For _____ due for opening on _____.

In short, he is fully authorized to do all, each and everything requisite for the above purpose concerning M/s _____ and I/We hereby agree to confirm and ratify his all and every act of this or any documents executed by my/ our said Attorney within the scope of the authority hereby conferred on him including references of cases to arbitration and the same shall be binding on me/ us and my/ our company/ Corporation/ society/ trust/ firm as if the same were executed by me/ us individually or jointly.

Witness

1)

2)

3)

(With address) Signature of the Partners/ Directors/ Board Members Executives/ Trustees/ Council members

Annexure - 5

COMPANY PROFILE

Sr. No.	Particular	Detail
1	Name of Organisation	
2	Nature of the Organisation	
a	In case of Public/Pvt. Ltd company (Certified copy of Certificate of incorporation for companies & Memorandum and Articles of Associations)	
b	In case of Partnership Firm (Partnership deed)	
c	In case of Proprietorship (Registration certificate, Factory registration, DIC – industrial registration)	
d	In case of society (Certified copy of registration deed with objects of constitution of society)	
e	In case of Corporation (Authenticated copy of the parent statute)	
3	Address with Phone No. and Fax No. E-mail, Website:	
4	Name and Contact details of the Authorized Person	
5	Any other details in support of your office	
6	PAN (attach attested copy)	
7	GST No.:	
8	TIN/ TAN No.:	

Bidder's Signature and Seal

Annexure – 6

ELIGIBILITY CRITERIA

Sr.	Criteria	Documents/Detail required	Documentary Proof attached (Y/N)
1	Minimum 03 (three) years of experience in the field of protected cultivation with usage of agrotextiles i.e Net house/ Ground cover/ Crop Cover/ Vermi bed, hail protection net in supply, installation, training and maintenance.	Certificate of incorporation, Business commencement certificate, Works to be demonstrated by Contract/Agreement/ Work Order from clients showing clearly 3 years of experience	
2	Minimum Annual Turnover for each year in the last three financial years (i.e., 2020-21, 2021-22 and 2022-23) should not be less than Rs. 5.00 crore.	**1.** Chartered Accountant certificate showing Minimum Annual Turnover of the agency in last 3 years (i.e., 2020-21, 2021-22 and 2022-23) clearly indicating the Turnover from construction activity of Agrotextiles / protected cultivation **2.** Audited Reports for last 3 years.	
3	The agency should be Agrotextile manufacturers/ authorized dealers/ suppliers willing to provide complete solution	Factory registration, DIC registration, List of machine and equipment and Undertaking (As per Annexure-7)	

Bidder's Signature and Seal

Annexure – 7

"UNDERTAKING BY THE BIDDER"
(To be provided on Rs. 100 non-judicial stamp paper)

1. That I / We _____ am / are the authorized nominee(s) of the firm _____ hereby submit tender to COE-Agrotech, SASMIRA for Erection of demonstration center at Navsari Agricultural University (NAU), Navsari, Gujarat. I/We are to state that the information provided in the tender form is true and correct.
2. I / We may be punished as per law for any wrong information, misleading facts provided in the tender form besides rejection of my / our tender.
3. In case of any dispute, the Jurisdiction will be Mumbai only.
4. I / We have carefully read all terms and conditions of the tender and I solemnly declare that the same are acceptable to me/us and binding on me/us.

Authorized Signatory with Seal

Place:

Date:

Name of Bidder: _____

Capacity in which signed: _____

Full address of the Bidder: _____
With seal & stamp:

(Attach Identity card Xerox): _____

Phone No.: _____

Mobile No.: _____

Bidder's Signature and Seal

Annexure – 8

Technical Evaluation Criteria

The Criteria for evaluating the Technical Bids would be as follows:

S. No.	Heading	Description	Criteria for point allotment	Max. Points
1	Firm's Experience (Marks = 55)	i) Proven and demonstrable experience in working for installation, commissioning, Training, capacity building and demonstration of long-term projects (at least 3 years) with Central/ State Governments/ Individual related to protected cultivation	• ≥ 20 projects experience = 35 • 10-15 projects experience = 25 • 5- 10 projects experience = 15	35
		ii) Proven and demonstrable experience in working for long term demonstration projects with agronomical services/ complete solution providing (more than 12 months) related to agrotextiles / protected cultivation	≥ 18 months experience = 20 12- 18 months experience = 10 Less than 12 months experience = 0	20

Bidder's Signature and Seal

2	Key Personnel (Marks = 30)	Educational Qualification: Graduate in Textiles, Agriculture/ Horticulture studies (such as B. Tech, B. Sc. or any other equivalent degree/ diploma) No. of qualified members > 5 = 15 marks No. of qualified members > 3 = 10 No. of qualified members < 2 = 0	**Team Leader:** To have atleast 10 years of working experience. Should have deep expertise in monitoring and advising installation, commissioning, demonstration of Agrotextile products. The candidate should essentially have strong working experience and prior experience in protected cultivation by using Agrotextiles will be an added advantage. **Other Team members:** To have atleast 5 years of working experience in project related to protected cultivation, installation, commissioning, and demonstration of Usage of Agrotextiles in Agriculture / horticulture development. To have experience in training the farmers on Hi-tech cultivation practices.	30 (15 marks for Team Leader) (15 marks for team members)
3	Project Methodology, approach and work plan (Marks= 15)	Technical Approach & Methodology for the project	Bidder to provide approach, methodology, and detailed work/activity plan, etc. for installation, commissioning, demonstration and training within given timelines. The bidder is to provide detailed plan for production of off-season crops, etc.	15
			Grand Total	**100**

Bidder's Signature and Seal

Annexure – 9

FORMAT FOR BANK GUARANTEE

(On ` 100 Non-Judicial Stamp Paper)

To be stamped according to Stamp Act and to be in the name of the executing Bank

To:

Senior Director
COE-Agrotech, SASMIRA
Sasmira Marg, Worli,
Mumbai - 400030

In consideration of the COE-Agrotech, SASMIRA, having its registered office at Sasmira Marg, Worli Mumbai -400 030 (hereinafter called the "Authority" which expression shall unless repugnant to the subject or context include its administrators successors and assigns) having agreed under the terms and conditions of the Award Letter bearing No _____ dated _____ issued by the Authority, which has been unequivocally accepted by the Vendor_____ (refer NOTE below) work of _____ (hereinafter called the said Contract) to accept a Deed of Guarantee as herein provided for Rs. _____ (Rupees _____only) from a Bank, in lieu of the security deposit, to be made by the Vendor or in lieu of the deduction to be made from the Vendor's bill, for the due fulfillment by the said Vendor of the terms and conditions contained in the same Contract. We _____ the _____ (hereinafter referred to be "the said Bank" and having our registered office at ____ do hereby undertake and agree to indemnify and keep indemnified to the Authority from time to time to the extent of Rs. _____ (Rupees _____ only) against any loss or damage, costs charges and expenses misused to or suffered by or that may be caused to or suffered by the Authority by reason of any breach or breaches by the Vendor and to unconditionally pay the amount claimed by the Authority on demand and without demand to the extent aforesaid. We, _____ Bank, further agree that the Authority shall be the sole judge of and as to whether the said Vendor has committed any breach or breaches of any of the terms and conditions of the said Contract and the extent of loss, damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by the Authority on account thereof and the decision of the Authority that the said Vendor has committed such breach or breaches and as to the amount or amounts of loss, damage, costs charges and expenses caused to or suffered by or that may be caused to or suffered by the Authority from time to time shall be final and binding on us.

1. We, the said Bank, further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said contract and till all the dues of the Authority under the said Contract or by virtue of any of the terms and conditions governing the said Contract have been fully paid and its claims satisfied or discharged and till the owner certifies that the terms and conditions of the said

Contract have been fully and properly carried out by the Vendor and accordingly discharges this Guarantee subject, however, that the Authority shall have no claim under the Guarantee after 180 (One Hundred Eighty) days from the date of expiry of the contract period.

2. The Authority shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee or indemnity, from time to time to vary any of the terms and conditions of the said contract or to extend time of performance by the said Vendor or to postpone for any time and from time to time any of the powers exercisable by it against the said Vendor and either to enforce or forbear from enforcing any of the terms and conditions governing the said contract or securities available to Authority and the said Bank shall not be released from its liability under these presents by any exercise by the Authority of the liberty with reference to the matters aforesaid or by reason of time being given to the said Vendor or any other forbearance, act or omission on the part of the Authority or any indulgence by the Authority to the said Vendor or any other matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so releasing the Bank from its such liability.

3. It shall not be necessary for the Authority to take legal action against the Vendor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank, notwithstanding any security which the Authority may have obtained or obtain from the Vendor shall at the time when proceedings are taken against the Bank hereunder be outstanding or unrealised.

4. We, the said Bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the Authority in writing and agree that any change in the Constitution of the said Vendor or the said Bank shall not discharge our liability hereunder. If any further extension of this Guarantee is required the same shall be extended to such required periods on receiving instructions from **COE-Agrotech, SASMIRA, Mumbai**.

For and on behalf of (the bank)

Signature _____

Name & Designation _____

Authorization No.

Date and Place

Bank Seal

The above guarantee is accepted by the Authority.

Annexure – 10

DETAIL OF COMPETENT PERSONNEL

Sr.	Name of Person	Qualification	Exp. in years in providing agronomical services / Agrotextile applications	Contact No.	Employed Full time/ part time