

### Specifications of C: N (or C: H: N: S) Analyzers

Computer controlled fully automatic Carbon, Nitrogen, Hydrogen (optional) and Sulphur (optional) analyzer for soil, plant, water and wide variety of organic and organometallic compounds. The analyzers must include all essential accessories sufficient for sample preparation and hassle free analysis. The analysis method should follow International Standard Method.

- High temperature resistance furnace, sensitive detector
- Analysis range: 0.02 to 100% or better
- Instrument sensitivity: <0.03% (or <0.5 micro gram)
- Analysis time: about 8 min, lesser will be preferred
- Maintenance free autoloader for at least 30 samples
- Thermal or Infrared detector for elements

Instrument should be quoted with

1. Equipment should be of standard make with appropriate certifications.
2. Consumables for at least 1000 samples for suitable certified reference standards as well as certified soil and plant standard with different C: N composition ratio.
3. PC of the latest version with suitable printer and software sufficient to be used for possible future up gradation.
4. An UPS appropriate to take complete load of equipment including PC, printer for at least 10 samples of CN (HS-optional) analysis as backup.
5. All accessories for sample preparation (solid or liquid)
6. One number of Combustion and carrier gas cylinder with necessary tubing and pressure regulators if essential.
7. Provision for carrier gas purifying and leak check diagnostic facilities
8. Instrument should be quoted with all spares sufficient for analysis without need of additional items (fixed or consumables).
9. Analyzer should be equipped with micro balance of high sensitivity (0.001mg or better) with provision of automatic weight transfer to analyzer.
10. Installation and demonstration must be preferably free of cost
11. Onsite warranty for a minimum period of **two years**.
12. Onsite or off site training of two persons or more person, sufficient to be skilled to do independent analysis and routine maintenance.

### Specifications for CO<sub>2</sub> analyzers

- Automated Soil CO<sub>2</sub> Flux measurement System under field conditions.
- Single chamber survey system with 10-20cm dia chamber to access spatial variability in Soil CO<sub>2</sub> Flux.
- Sufficiently handy and built for accurate CO<sub>2</sub> flux measurements through accounting altered diffusion gradient and pressure differentials, ensuring thorough mixing and minimizing external disturbance.
- Measurement range: up to 10,000ppm or better.
- Provision for data storing and downloading.
- Quotation should include all essential items used in operation of single chamber Soil CO<sub>2</sub> flux survey system including power backup.
- Temperature and moisture probe if essential and not inbuilt in the system should be quoted separately.
- Warranty for a minimum period of two years.
- Training and demonstration and calibration of equipment are essential and should be free of cost.

### Specification for UV-VIS Spectrophotometer

| S.No. | Particulars                   | Specification   |
|-------|-------------------------------|---|
| 1.    | Type                          | The equipment should be static, bench-top model for indoor use.   |
| 2.    | Beam Geometry                 | Dual Beam   |
| 3.    | Wavelength range              | 190 - 1100 nm   |
| 4.    | Band pass/ Spectral bandwidth | At least 1.4 nm   |
| 5.    | Scan speed                    | Up to 3600 nm/min   |
| 6.    | Detector                      | Silicon photodiode-based  |
| 7.    | Measurement modes             | The equipment should have different measurement features such as spectrum, photometric, quantitation, kinetics, multi-component quantitation, biometric modes etc |
| 8.    | Operating environment         | The equipment should be able to function between environmental temperature range of 10-40°C and up to 90% relative humidity                                       |
| 9.    | Power source                  | 100/240V; 50/60Hz   |
| 10.   | Display                       | TFT/LED/LCD display/monitor or optional PC-Control with Windows operating system compatibility  |
| 11.   | Cell Holder                   | At least 6 cell holders   |
| 12.   | Standard accessories          | At least 6 quartz cuvettes as per size that fits the cell holder (preferably 1cm path length)   |
| 13.   | Optional accessories          | Other optional accessories may also be mentioned in the offer document  |
| 14.   | Standards                     | Should conform to international standards such as ISO, CE, EMC, IEC, or CISPR etc   |

|     |               |   |
|-----|---------------|---|
| 15. | Proof of sale | The supplier should produce proof of supply of the equipment to laboratories of ICAR institutes or CSIR laboratories.   |
| 16. | Installation  | Supply of the equipment would be deemed complete after the supplier delivers the equipment at ICAR-NRC on Litchi, installs the equipment, and provide demonstration and user training to the indenting officer. |
| 17. | Warranty      | Atleast one year <b>on-site</b> warranty  |

## Specification for Centrifuge

### Basic features

1. Compact floor mounted model with minimal foot print and castor for easy movement; Refrigerated (2-4°C)
2. Max Speed (RPM): 15,000 or more with 4-6 x 50 ml tubes and minimum 20,000xG
3. Multiple rotor choice for 0.2 ml, 0.5 ml, 1.5 /2.0 ml tubes, 5 ml, 15 ml, 30 ml and 50 ml; All rotor should have minimum 20000 G force
4. Facility (Rotor) to run the Micro titer plate (MTP) / 96 well PCR plate (two at the same time) at 10,000 rpm or more.
5. Capacity to spin 72 Eppendorf tubes 1.5 ml/ 2.0 ml at the same time
6. Light Weight Carbon fibre rotors with easy to load and remove without any tools
7. Facility to store run program, Standby cooling and power save mode
8. Microprocessor based control system, LED display, inbuilt safety device, automatic rotor recognition, timer (1-99 minutes); Low noise ( $\leq 50$  db)

### Others:

1. The main unit with rotor for 15 ml and 50 ml to be essentially quoted. All other accessories/ rotors, to be quoted in option.
2. Suitable voltage stabilizer to be provided with the machine.
3. Installation and demonstration on-site. ISO certified manufacturer and supplier.
4. User/Technical/Maintenance Manual, Certificate of calibration to be supplied.

\* Firm should provide compliance to each features in tabular form while submitting quote for equipment

Vendor's name

## Specification for Water Activity Meter

| S.No. | Particulars                                | Specification   |
|-------|--|---|
| 1.    | Type                                       | The equipment should be static, bench-top model for indoor use.   |
| 2.    | Weight                                     | < 5 kg  |
| 3.    | Operating environment                      | The equipment should be able to function between environmental temperature range of 5-50°C and 20-90% relative humidity                     |
| 4.    | Power source                               | 100/230V; 50/60Hz   |
| 5.    | Water activity ( $a_w$ ) measurement range | 0.040 – 1.000 $a_w$ , preferably with trend indicator   |
| 6.    | Accuracy                                   | Not more than $\pm 0.005 a_w$ with high degree of repeatability and reproducibility   |
| 7.    | Measurement time/Read Time                 | $\leq 6$ minute   |
| 8.    | Temperature and humidity adjustment        | The equipment should have provision for automatic temperature and RH adjustment   |
| 9.    | Sample port/size (Dish capacity)           | 10-30 ml  |
| 10.   | Sample versatility                         | The equipment should be able to measure water activity of diverse food products in solid, liquid, or semi-liquid forms                      |
| 11.   | Display                                    | Clear digital display (TFT/LED/LCD etc)   |
| 12.   | Standard accessories                       | Sample cups (10 Cups if reusable/ atleast 100 if disposable cups)   |
| 13.   | Optional accessories                       | Printer : To print data straight from the equipment in real time.<br>Other optional accessories may also be mentioned in the offer document |
| 14.   | Standards                                  | Should conform to international standards such as ISO, CE, EMC etc  |

|     |                    |   |
|-----|--------------------|---|
| 15. | Data communication | USB port for data transfer  |
| 16. | Proof of sale      | The supplier should produce proof of supply of the equipment to laboratories of ICAR institutes or CSIR laboratories.   |
| 17. | Installation       | Supply of the equipment would be deemed complete after the supplier delivers the equipment at ICAR-NRC on Litchi, installs the equipment, and provide demonstration and user training to the indenting officer. |
| 18. | Warranty           | Atleast one year <b>on-site</b> warranty  |

### **BOD INCUBATOR**

- Temperature from 5°C to 50°C  $\pm 0.5^\circ$  C. Double walled.
- Inside anodized Aluminum/Stainless steel & outside Mild steel sheet painted in epoxy powder coating.
- With perforated adjustable metal shelves. To work on 220 / 230 volts A.C.
- Two air circulating fan & transparent unbreakable Acrylic transparent door inside. Supplied with Electronic Digital Temperature/ humidifier Controller cum indicator.
- Two hours backup with 10 KVA online UPS.
- Two years warranty against any manufacturing defect..



## **Specifications for stereo binocular microscope/ Trinocular Stereozoom microscope with photography attachment**

- Zoom Ratio 6.7 : 1 or more
- Working distance 110 mm or more
- Transmitted and reflected LED light source
- 10x eyepiece with field number 22 or more
- Magnification Range 4.5x- 45x or more.
- live image C-MOS camera 5 mpg with image analysis software and compatible output device.
- 2 years warranty against manufacturing defect.

**Note:** Standard brands like Olympus, Nikon, Lica etc. will be preferred.

## Technical Specifications of laboratory spray dryer

Suitable for Aqueous / solvent Feed solutions with **Twin High Efficiency Cyclons**, having **Spray Pro PC Software** and **Feed pump reverse facility**

Evaporation Capacity: 1.0 L/hr H<sub>2</sub>O

Drying temperature input range: 50-280 oC

Air Flow: 10-35 cu.m/hr

Nozzle : Two-fluid, co-current, SS-316 L, 0.7 mm with auto-de-blocking device and option of variable nozzle apertures 0.5, 1.0, 1.5 mm with ultrasonic nozzle facility

Power Rating: Up to 3000 W ; Voltage: 220 V  $\pm$  10%

Heater Capacity: 2.5- 3.0KW, with 0.25HP 3 Phase Flameproof Blower

Spray gas: Compressed air 200-1000 l/hr, 5-8 bar.

Mean Dwell time: 1.0 - 2.0 seconds

Possible particle diameter range: 1-25  $\mu$ m

Material of construction: Stainless steel 316L

Heating apparatus: Borosilicate Glass

Interconnection parts: Teflon, Silicon, Alkathene

Drying chamber: 8-10" diameter

Pressure: 80- 100 PSI.

Delta HMI PLC Ladder Based **Built-in Control System** for control of Hot Plate, Magnetic Stirrer & Mechanical stirrer through Touch screen.

Selection of Either Magnetic or Mechanical Stirrer at a time through PLC & Touch screen HMI.

**Oil free air compressor Piston Type Max.**

Drying Air Flow rate & Max Temperature in Insulated condition.

- **Should provide catalogue and user list**

### **Extra Spare Parts**

All glass parts: one set.

Cyclone Scrubber: 1 No. ; Collection bottle: 1 No.; Collection pot: 1 No.

2 sets of silicon gaskets and O-rings for glassware

Product feeding tube for pump: 2 mtrs

Set of electrical panel fuses:

Co current nozzles: 1 No each.

## Specification for ~~Fermenter~~ Bioreactor

### General:

Jacketed type for cooling and steam heating with dished top and bottom of

Capacity: 3-5 litre working volume.

All inner contact parts will be in S.S. 320 including Strainer etc.

Pressure: 50 PSI.

Accurate controls with digital readout for Aeration, temperature, PH & O<sub>2</sub>

**Agitator:** Turbine type,

Variable rpm: Up to 1200

Autoclavable glass vessel Agitation

In situ sterilization, Agitation, Aeration, antifoam controller system

Should attach catalogue and userlist

### Technical specification:

---

|                               |  |
|-------------------------------|--|
| <b>Working volume of</b>      | Pyrex glass with 5 to 8 side necks; 3-5 liter vessels  |
| <b>Fermenter vessel</b>       |  |
| <b>Vessel choice</b>          | Double-walled vessel with water-jacket and heat-blanketed, autoclavable  |
| <b>Function</b>               | Fermentation and cell culture monitoring and control   |
| <b>Temperature control</b>    | High efficiency 150 W infrared (IR) radiation heat source with gilded parabolic reflector, PID for heating and cooling                         |
| <b>Sensor</b>                 | Platinum RTD probe (Pt 100)  |
| <b>Regulation</b>             | from 5°C over RT to 80°C   |
| <b>Precision</b>              | Digital display in $\pm 0.1^\circ\text{C}$ (0 to 70°C)   |
| <b>pH control</b>             | Sterilisable pH electrode pH 0-14 with automatic temperature correction, two-point semiautomatic calibration and Variopin connector            |
| <b>Resolution</b>             | 0.01 pH unit   |
| <b>Precision</b>              | $\pm 0.02$ pH unit   |
| <b>pO<sub>2</sub> control</b> | Sterilisable sensor with fast response, automatic temperature correction, dissolved oxygen (DO) control through regulation of the airflow rate |
| <b>Range</b>                  | 0 to 20 mg oxygen/l, in 0.1 mg/l steps   |

---

---

|                          |   |
|--------------------------|---|
| <b>Air flow</b>          | 0 to 5 l/min in 0.01 l/min steps, measured by precise mass flow meter, linearity +/- 3%, reproducibility +/- 0.5%   |
| <b>Control</b>           | Proportional valve controlled by microprocessor as well as manual   |
| <b>Agitation</b>         | 0 to 1200 rpm, in 0.1 Hz steps (6 rpm) with 1 or more stirring discs; Sterility similar to magnetic coupling  |
| <b>Cell culture</b>      | 20-300 rpm, direct or magnetic drive, pitched blade impeller  |
| <b>Control parameter</b> | Additional parameter can be controlled by the instrument (foaming control, weight (for continuous cultures), pCO <sub>2</sub> , redox potential, conductivity, optical density, etc.)   |
| <b>Ports</b>             | One large quadruple sampling or additions port with four needles with double-seal connections, used for sampling, inoculation, antifoam, feeds, harvest, addition of correction solutions etc., with additional double ports  |
| <b>Pumps</b>             | Up to 4 independent pumps with speed variation from 0 to 100 %  |
| <b>Gas flow control</b>  | In addition to pumps, several electronic flow controllers (0-4 Rotameters) with flow rate ranges of • 0-150 mLpm • 250-2500 mLpm • 1-5 Lpm • 1-20 Lpm can be used for the controlled addition of gases (e.g. N <sub>2</sub> , O <sub>2</sub> , air, CO <sub>2</sub> ) in cell cultures; freely configurable gas station module. One Thermal Mass flow Controller (TMFC) • 0.04-20.00 SLPM |
| <b>Working Temp.</b>     | 0 – 40 °C   |
| <b>Working humidity</b>  | 0 - 90 % RH, not condensing   |
| <b>PC control</b>        | Complete PC control and data processing using the fermentation software FNet/ SCADA based computer software (for up to 4 MINIFOR fermenters) or SIAM (for an even higher number of instruments)   |
| <b>Accessories</b>       | 6 sets of 250 ml feed bottle with disposable disc filter, silicone tube 50 meters, sufficient no of O-rings, septa etc required for smooth running of the system for three years.   |
| <b>Warranty</b>          | Preferably 3 years from date of installation  |

---

**Specification for installation of standalone Irrigation System with Generator and Borewell in 4 Ha area.**

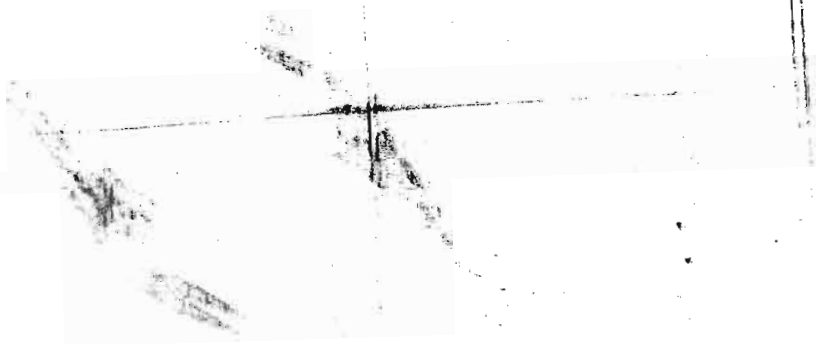
| Sl. No. | Particulars   | Size                    | Total | Unit |
|---------|---|-------------------------|-------|------|
| 1       | Providing and lowering of submersible pump with casing, 10 HP having discharge of 180 LPM at 150 MTR head, suction and delivery pipes, Filter, Gravel packing, installation, earthing, control panel, panel box, Starter, Wiring, submersible cable, GI pipes upto Head Unit Etc. in complete   | 10 HP                   | 1     | Set  |
| 2       | G. I. Head Unit, By pass Assembly with Butter fly Valve, Dual battery of Hydrocyclone Filter, Disc Filter with changeover arrangement, Pressure release valve, Air release Valve, Butter Fly Valve, Fertilizer tank, Foundation complete in all respect.  | 3"                      | 1     | Set  |
| 3       | Supply and laying PVC pipe of reputed brand conforming IS standards in the trench to be provided (transporting, loading and unloading, included, along with Flush valve, PVC bend, Tee, Solvent cement, MTA, FTA, Air release Valve as the joining of pipes should be done with high quality solvent cement:  |                         |       |      |
|         | i) 110 MM 4 KG/CM2  | 110 mm                  | 312   | Mtr  |
|         | ii) 75 MM 4 KG/CM2  | 75 mm                   | 342   | Mtr  |
|         | iii) 63 MM 4 KG/CM2   | 63 mm                   | 784   | Mtr  |
| 4       | Excavation trenches of required width of pipes, cable, including excavation for sockets and dressing of sides, ramming of bottoms, depth upto 600 mm including getting out the excavated soil and then returning the soil as required, in layers not extending 20 cm in depth including consolidating each deposited layer by ramming, watering etc. and disposing off surplus excavated soil within a lead of 50 m, Trenching is also inclusive of Road cutting at any place as required | 18 " wide and 30" Depth | 1438  | Mtr  |
| 5       | Providing , laying and joining 16 mm Plain lateral CL - 2 conforming international standards with Gromate, take off, Joiner 16 mm x 17 mm and connection with Pipe Line   | 16 mm                   | 8100  | Mtr  |
| 6       | Providing, laying and joining 16 mm Emitting pipe lateral CL -2 conforming international standards with Tee 16 mm, End Cap and connection with 16 Pipe Lateral Line at all plant location wherever required as a loop of 10 Mtr Length for the fully grown plants .   | 16 mm                   | 519   | Set  |
| 7       | Providing , laying and joining 16 mm Emitting pipe lateral CL -2 conforming international standards with Tee 16 mm, End Cap and connection with 16 pipe Lateral Line at all Plant location where ever required as a loop of 5 Mtr Length for the fully grown plants .   | 16 mm                   | 470   | Set  |
| 8       | Valve for 90/75 mm PVC pipes for manifold and section of submain consisting of Butterfly valve flanged end, Tee, Elbow with necessary fitting over and under the ground.  | 90/75/63 mm             | 11    | Set  |



|   |   |        |   |     |
|---|---|--------|---|-----|
| 9 | Generator 25 KVA ISI Mark with lubricant, wiring to control pannel, MCB, Foundation, Base and necessary fittings to start Submersible Pump, Earthing as per requirement in complete | 25 KVA | 1 | Set |
|---|---|--------|---|-----|

**Note:**

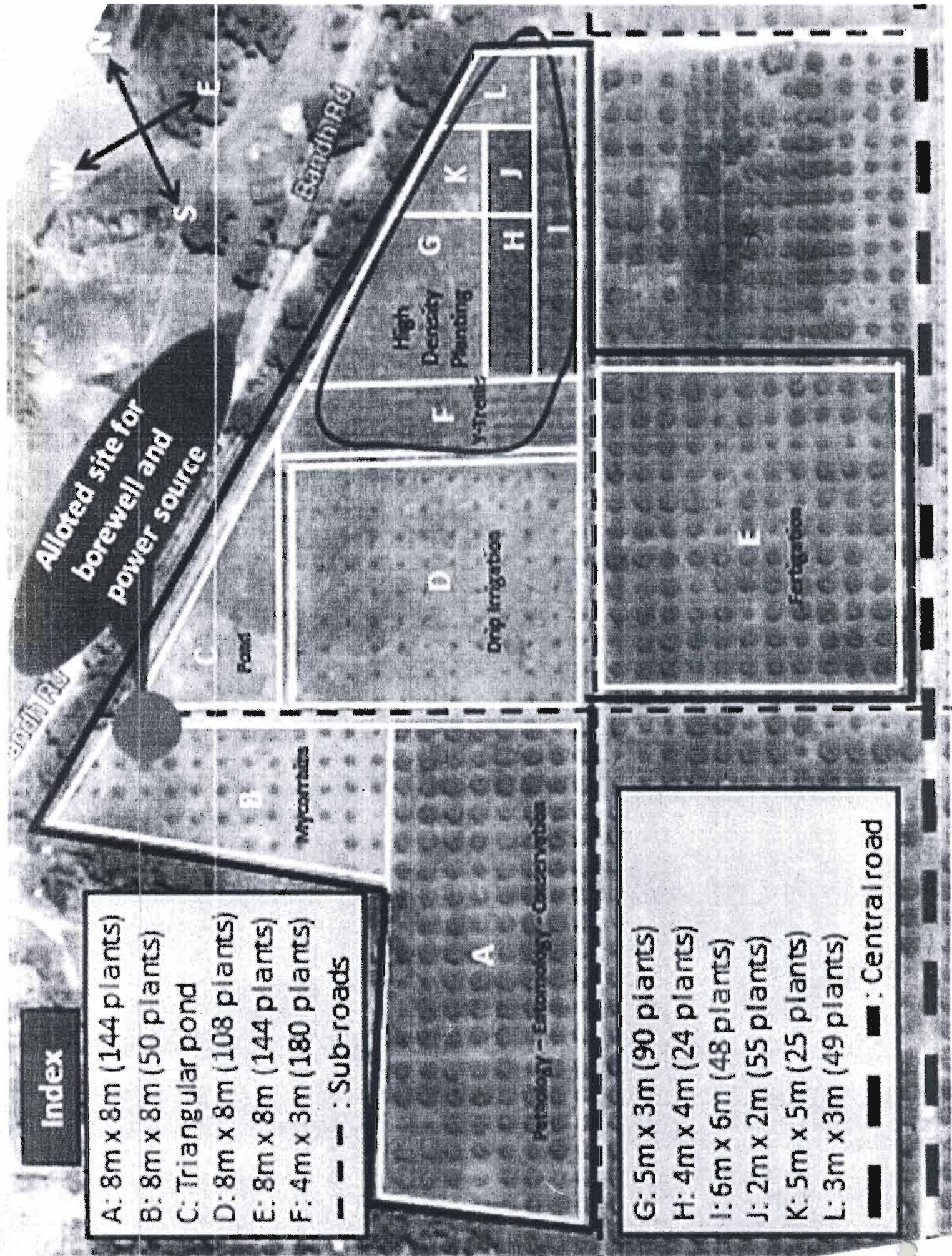
1. Each plant must be provided with a LOOP of Emitting pipe lines for even distribution of water in the canopy area.
2. The four Ha (4.00 Ha) area should be divided into four section with Irrigation time of Two Hours/day/section in Peak water requirement period.
3. The system must possess an efficient Filtration unit with pressure meter, venturi, emitters and the required accessories
3. Provision for automisation of the system should be taken into consideration in future.





### Index

- A: 8m x 8m (144 plants)
- B: 8m x 8m (50 plants)
- C: Triangular pond
- D: 8m x 8m (108 plants)
- E: 8m x 8m (144 plants)
- F: 4m x 3m (180 plants)
- - - : Sub-roads



- G: 5m x 3m (90 plants)
- H: 4m x 4m (24 plants)
- I: 6m x 6m (48 plants)
- J: 2m x 2m (55 plants)
- K: 5m x 5m (25 plants)
- L: 3m x 3m (49 plants)
- — — : Central road

Fig. 1. Blocks for installation of standalone Irrigation System



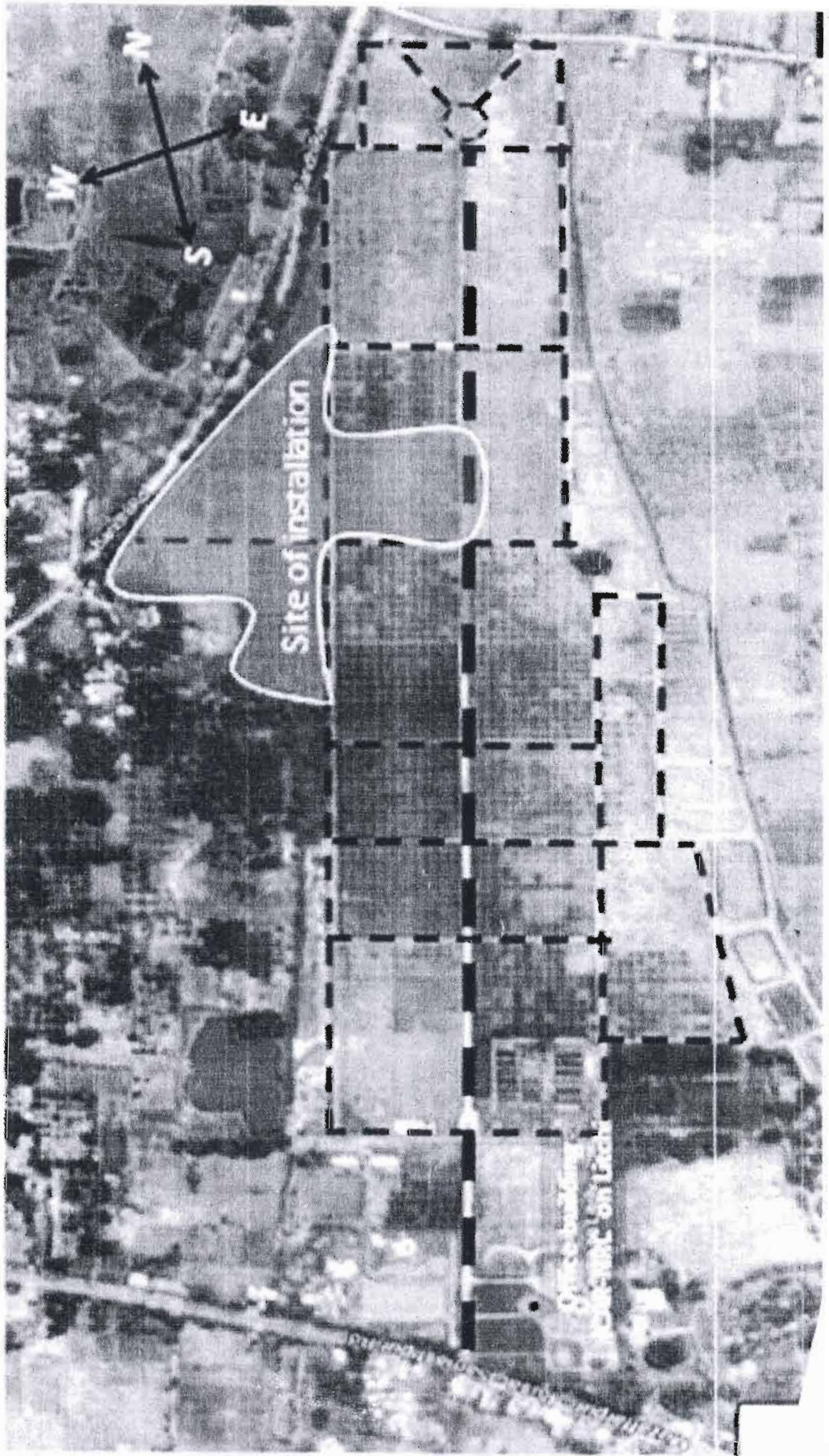


Fig. 2. Location of the installation site



## Screen cum Pot House

Unit Area: (4000 Sqft approx)

Length: 101.0', Width: 41.0', Ridge Height: 13.0', Gutter Height: 8.0'

**Design:** Hut shape with automatic exhaust fan form top (roof).

| S N | Description of Material/ Work   |
|-----|---|
| 1.  | Main Structure: Made of 2m thick ISI marked (1239), GI tubular framing for vertical members, roof truss, horizontal runners etc, including cutting, bended in required shape, 80mm, 50mm, 40mm, 32mm, 25mm complete as per requirements |
| 2.  | Doors: 2.0m x 1.0m made of G. I. Sq. pipe with door closer & all hardware Two Nos.  |
|     | Roof Glazing: With pre-painted profile sheet fixed with screw, along the purlins rafters  |
| 3.  | Side wall covering: With GI net 30x30mm to be fixed along the side purlins  |
| 4.  | Foundation: Grouting of side poles (35 x 35 x 75cm) below earth surface in cement concrete 1:2:4 (1: cement, 4 coarse sand, 4 stone aggregate)  |
| 5.  | Electric Fitting: Complete electrical wiring of screen house with copper wire, MCB, light/ power points (3+3) CFL with fittings 5 nos., automatic exhaust fan with suitable number to keep the structure cool.                          |
|     | Generator (noiseless): 60 <del>kw</del> KVA (3 phase) with control system and generator platform with shade <i>including earthing.</i>  |
| 6.  | Brick work: 60cm (30cm underground and 30cm above the foundation)   |