



**UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION
ORGANISATION DES NATIONS UNIES POUR LE DEVELOPPEMENT INDUSTRIEL**

TERMS OF REFERENCE

**Equipments supply for phase-out methyl bromide in tomato sector in Morocco
MP/MOR/04/140**

1. THE PROJECT:

The project aim is to phase out 649.83 tonnes of MB (2002 consumption) used mainly in tomato production, not excluding other horticulture crops. Note that the strawberry, banana and flower sectors are covered by separate projects.

The technologies chosen are: solarization combined with chemical fumigants (1,3-D, chloropicrin and metam sodium); solarization combined with bio-fumigation; grafting, alone or combined with the above mentioned alternatives; all of them combined with an Integrated Pest Management (IPM) program.

In the horticulture sector, MB consumption is tightly linked to protected tomato production. Protected tomato production is a highly intensive crop, which corresponds to a considerable investment in terms of equipment and crop management. The major tomato production area is along the Atlantic coast, with the highest concentration in Agadir area. The average farm area ranges from 500 m² to 1 Ha. Most of the producers are associated under the Association marocaine des Producteurs et Exportateurs des Fruits et Légumes (APEFEL), an organization that coordinates all issues related to marketing, technical assistance, technology development and transfer.

2. GENERAL INFORMATION:

These terms of reference shall be used for the preparation of bids for the supply of equipment and services for the production of grafted tomato seedling and tomato cropping, required to phase-out methyl bromide in the tomato sector in Morocco using the grafting technology:

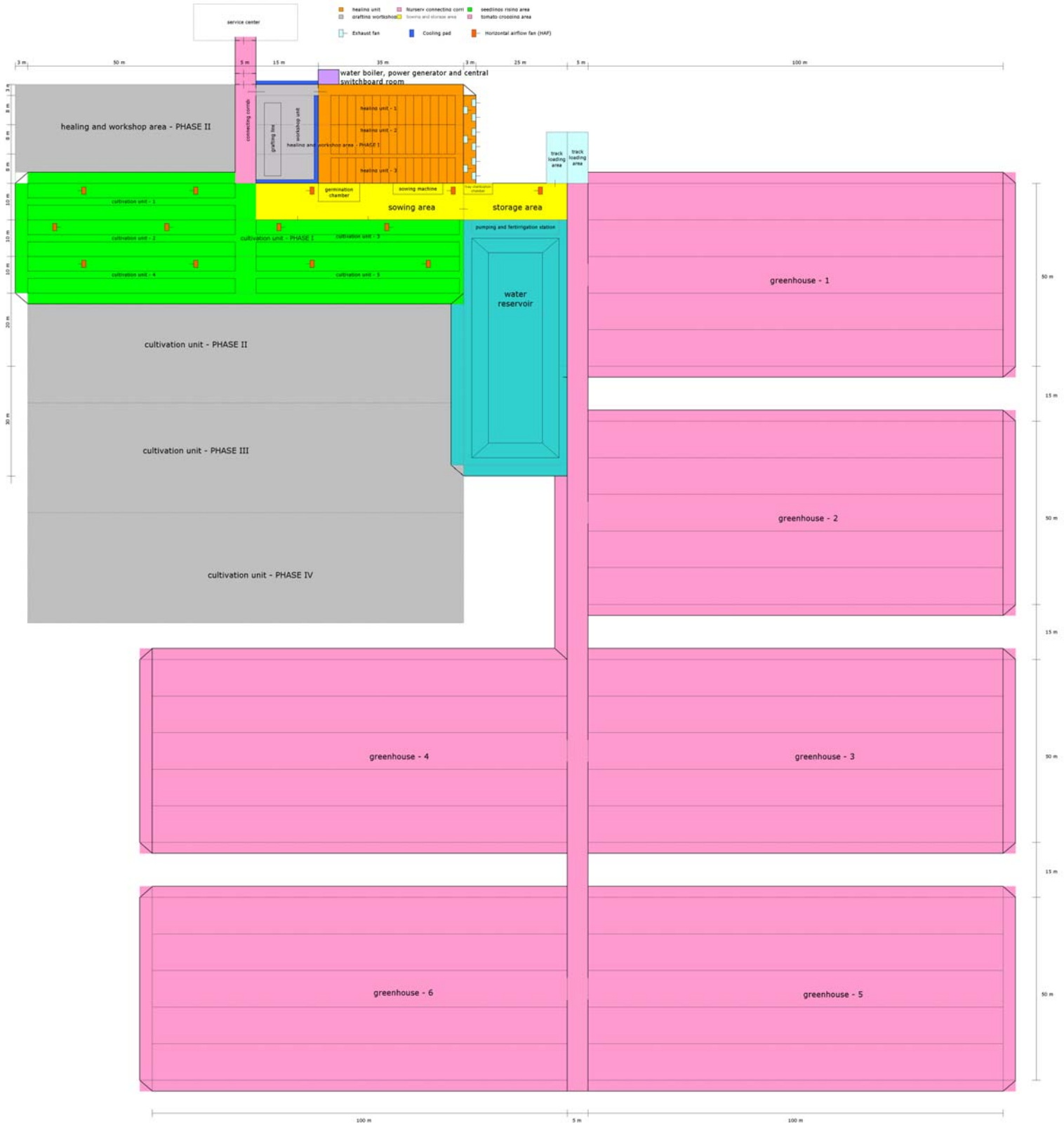
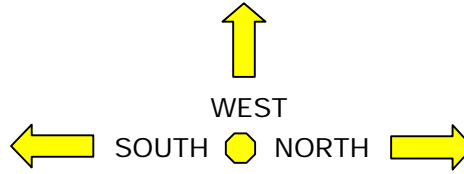
To be delivered DDU to Agadir (Morocco) according to the specifications described later.

For overseas suppliers, the Government of Morocco will authorize a free customs clearance.

3. SCOPE OF THE SUPPLY:

- 3.1 **Item 1:** ~ 1,500 m² of fully equipped greenhouses for the production of grafted seedlings.
- 3.2 **Item 2:** ~ 2,500 m² of fully equipped greenhouses for the seedlings rising.
- 3.3 **Item 3:** ~ 750 m² of greenhouses for auxiliary equipments and storage.
- 3.4 **Item 4:** ~ 30,000 m² fully equipped greenhouses for tomato cropping, total area. No. 6 blocks, for ~ 5,000 m² each one.
- 3.5 **Item 5:** ~ 1,750 m² of net-house water reservoir.
- 3.6 **Item 6:** Auxiliary equipments.
- 3.7 **Item 7:** technical supervision for installation.
- 3.8 **Item 8:** technical assistance for grafted tomato seedling production.
- 3.9 **Item 9:** Manuals and technical information.

4. GREENHOUSES LAYOUT:



5. TECHNICAL SPECIFICATIONS see layout § 4.

5.1 ITEM 1:

~ 1,500 m² of greenhouses and equipments for grafted seedlings production. It includes the grafting workshop and healing units.

5.1.1 Structure:

5.1.1.1 Type: chapel 3 span.

5.1.1.2 Long: at least 50 m, 15 m (grafting workshop area) + 35 m (healing units).

5.1.1.3 Wide: minimum 27 m. Consisting of No. 3 spans, ranging from 8 to 9.6 m wide, + a lateral corridor (west side) 3 m wide.

5.1.1.4 Poles, arches and other steel parts: hot steel galvanized.

5.1.1.5 Gutters: designed for 50 l/m²/h rainfalls, hot steel galvanized (zinc coating thickness: minimum 400 microns).

5.1.1.6 Doors: at least 2.5 m wide and 3.0 m height

a. No. 2 doors in the healing unit

b. No. 2 doors in the connecting corridor (double door).

5.1.1.7 Aluminum poly lock system, no wood.

5.1.1.8 Gutter height: minimum 4.50 m.

5.1.1.9 Vents:

a. Roof: No top roof vents.

b. Sidewalls:

i. East sidewall (healing unit) polyethylene film rolling curtain.

ii. West sidewall (healing unit) polyethylene film rolling curtain. 18/05/05

iii. South sidewall (workshop unit) polyethylene film rolling curtain.

5.1.1.10 Cover specifications, form outside through inside:

a. Roof: aluminum screen 75% shade + clear polyethylene film (200 micron, UVA additive, antifog treated).

b. Sidewalls:

i. East: clear polyethylene film (200 micron, UVA additive).

ii. North: aluminum screen 75% shade + clear polyethylene film (200 micron, UVA additive).

iii. West: aluminum screen 75% shade + clear polyethylene film (200 micron, UVA additive) rolling curtain, insect proof screen 20/20.

iv. South: clear polyethylene film (200 micron, UVA additive) rolling curtain + insect proof screen 20/20.

c. Connecting corridor (pink color in the drawing): aluminum screen 75% shade + insect proof screen 20/20.

d. Exhaust fans: insect proof screen 20/20.

5.1.1.11 Separation wall between the healing unit and the grafting workshop unit: clear polyethylene film (200 micron, UVA additive, antifog treated), includes the gables.

5.1.1.12 Bolts and nuts: zinc coating.

5.1.1.13 Fixing devices: only bolts and nuts no welding allowed for installation.

5.1.1.14 Withstanding gust of wind: minimum 130 Km/h.

5.1.2 Equipments:

5.1.2.1 Inner aluminum screen (fabric open structure):

a. Healing unit:

i. Ceiling: horizontal retractable motorized screen, 60% shade, one motorized sector,

switchboard manual and automatic, light sensor and all cabling.

- ii. Sidewall, west and north, from top to bottom: fixed screen, 75% shade.
 - b. Grafting workshop unit: ceiling and sidewalls, south and west, from top to bottom: fixed screen, 95% shade.
- 5.1.2.2 Cooling plant:**
- a. Wet pad area: ~ 108 m².
 - b. Accessories: water tank, circulating pump, piping, filters, valves and accessories for installation.
 - c. Switchboard, manual and automatic set, No. 1 temperature sensors and cabling.
- 5.1.2.3 Exhaust fans:**
- i. North sidewall: No. 6, power 1.5 HP, ~35,000 m³/h (No. 1 temperature sensor).
 - ii. North gables: No. 3, power 1.5 HP, ~35,000 m³/h (No. 1 temperature sensor).
 - iii. South gables: No. 3, power 0,5 HP ~8÷9,000 m³/h (No. 1 temperature sensor).
 - iv. Double door entrance connecting corridor: No. 1, power 0,5 HP ~8÷9,000 m³/h.
 - v. Track loading area: No. 2, power 0,5 HP ~8÷9,000 m³/h.
 - vi. Switchboard, manual and automatic set, temperature sensors (total No. 3) and cabling.
- 5.1.2.4 Ground heated micro tunnels - rolling benches:**
- a. No. 30 micro tunnel ~ 7.60 m long, 2 m wide.
 - b. No. 15 micro tunnel ~ 6.30 m long, 2 m wide.
 - c. Design: see ANNEX I.
 - d. Heating plant - Temperature: the heating plant has to ensure a temperature of 27°C, delta-t maximum 12°C.
 - e. Heating element: micro pipes carpet, pipes diameter 6.0 mm, in and out manual valves, piping and accessories for the connection to the water boiler. Water content: ~3.6 liters/m²; water flow: ~35 liters/h/m².
 - f. Micro pipe carpet covering, from the micro pipe carpet upward: transparent polyethylene sheets 0.2 mm thickness + sub irrigation tablecloth ~ 3.0 mm thickness + black mulching fabric.
 - g. Micro tunnel covering and opening: transparent polyethylene sheets, 0.2 mm thickness, both side rolling curtains.
 - h. Cooling - Overhead sprinklers system: one single section (No. 1 electro valve, No. 1 temperature sensor).
 - i. Each micro tunnel is supplied with an individual overhead sprinklers system.
 - ii. Water flow rate: 3 l/h/sprinkler.
 - iii. Valves: No. 1 electro valve (total No. 1). No. 1 manual valve for each micro tunnel (total No. 45).
 - iv. Pressure regulator: set 2 bar; No. 1 for the entire healing unit (total No. 1).
 - v. Switchboard, manual and automatic set, No. 1 temperature sensors and cabling.
- 5.1.2.5 Gas water boiler: fitting for the micro tunnels heating plant, includes, among the others:**
- a. No. 3 circulating pumps (one for each healing unit).
 - b. No. 3 temperature sensors
 - c. Switchboard and cabling.
- 5.1.2.6 Water plant: No. 7 valves 1", junctions and accessories as necessary.**
- a. No. 1 valve per each healing unit span, total No. 3 valves.

- b. No. 1 valves in the workshop area
- c. No. 1 valve to supply the cooling pad
- d. No. 1 valve in the heating/power generator room.
- e. No. 1 valve in the connecting corridor.

5.1.2.7 Switchboards: all switchboards must be placed in the water boiler and power generator room.

5.1.2.8 Four wheel trolleys: No. 15 trolleys for seedlings movement. Tray dimensions 68 x 35 cm. Distance between the trays 30 cm.

5.1.2.9 Black mulching fabric: ~ 800 m².

5.2 **ITEM 2:**

~ 2,500 m² of nethouse and equipments for seedling rising.

5.2.1 **Structure:**

5.2.1.1 Type: net house, chapel or Canary type.

5.2.1.2 Long: ~ 105 m.

5.2.1.3 Wide: ~ 30 m (No. 3 span ranging from 9 to 10 m). One half-span, north/east (see Item 3), incorporates the sowing and storage area.

5.2.1.4 Poles height: minimum 5.00 m.

5.2.1.5 Vents:

- a. Roof: no vents.
- b. Sidewall: polyethylene film rolling curtain.

5.2.1.6 Poles, wires and other steel parts: steel galvanized, no wooden part.

5.2.1.7 Cover specifications, form outside through inside:

- a. Roof: insect proof screen 20/20.
- b. Sidewall and front walls: clear polyethylene film rolling curtain (200 micron, UVA additive, antifog treated) rolling curtain + insect proof screen 20/20.

5.1.2.10 Bolts and nuts: zinc coating.

5.1.2.11 Fixing devices: only bolts, nuts and clips, no welding allowed for installation.

5.1.2.12 Withstanding gust of wind: minimum 130 Km/h.

5.2.2 **Equipments:**

5.2.2.1 No. 3 overhead irrigation trolleys (Suspended rail):

- a. No. 1 per span.
- b. Irrigation and fumigation nozzles on separated pipes.
- c. Click clack drip-proof ceramic nozzles, 11008 and 11002.
- d. Pressure regulator (2 bar), valves, proportional liquid injector (0.1-2.0% range) and flexible pipe.
- e. Drive/return gear motor with steel rope, switchboard, manual back and forward switch, cabling.

5.2.2.2 Water plant: No. 5 valves 1", junctions and accessories as necessary. No. 1 valve per cultivation unit.

5.2.2.3 Horizontal airflow fan (HAF): No. 10 peaces, 0.5 HP, 8÷9,000 m³/h, temperature sensor,

timer, switchboard and cabling.

- 5.2.2.4 Misting system: compressed air / low-pressure water misting system, to be placed right below the roof.
- No. 1 nozzle/~ 100 m².
 - Includes water and air piping and nozzles.
 - No. 2 electro valve (No. 1 water + No. 1 air).
 - No. 10 manual valves (No. 5 water + No. 5 air), to split the whole cultivation area into the 5 sections.
 - Air compressor.
 - Switchboard, manual and automatic set, No. 1 temperature sensors and cabling as required.
- 5.2.2.5 "T" rail frame benches for suspended trays cultivation: No. 10 sectors ~ 4,25 m wide and ~ 50 m long. Assembled by zinc coating tube and aluminum "T" rail bar, 0.70 m height from the ground, lengthways corridor ~ 1.50 m wide. Tray dimensions: 676 (± 2) x 346 (± 1) mm.
- 5.2.2.6 Inner aluminum screen (fabric open structure): only ceiling, horizontal retractable motorized screen, 60% shade, one motorized sector, switchboard manual and automatic, light sensor and all cabling.
- 5.2.2.7 Black mulching fabric: ~ 2,500 m².

5.3 **ITEM 3:**

~ 750 m² of greenhouses for auxiliary equipments (sowing area) and storage, it is the extension of the "cultivation area – 1", same structure. Includes also the track loading area.

5.3.1 **Structure:**

- 5.3.1.1 Type: net house, chapel or Canary type.
- 5.3.1.2 Long: 75 m.
- 5.3.1.3 Wide: ranging from 9 to 10 m accordingly.
- 5.3.1.4 Track loading area: 5 m wide and 14 m long.
- 5.3.1.5 Doors:
- No. 1 sliding door, net covered, between the sowing area and the storage area.
 - No. 2 sliding doors, net covered, in and out track loading area.
- 5.3.1.6 Cover specifications, form outside through inside:
- Roof: aluminum screen 75% + polyethylene film (200 micron, UV additive, antifog treated).
 - Sidewall east: insect proof screen 20/20.
- 5.3.1.7 Water plant: No. 3 valves 1", junctions and accessories as necessary.
- No. 2 valves in the sowing area.
 - No. 1 valve in the storage area.
- 5.3.1.8 Horizontal airflow fan (HAF): No. 3 peaces, 0.5 HP, 8÷9,000 m³/h, temperature sensor, timer, switchboard and cabling.

5.4 **ITEM 4:**

No. 6 blocks of ~5,000 m² fully equipped greenhouses for tomato cropping, total area

~30,000 m². Each block has the following specification:

5.4.1 Structure specification:

- 5.4.1.1 Type: chapel or Canary type, plastic covered with roof ventilation.
- 5.4.1.2 Long: ~100 m + one (south) front corridor 5 m wide connecting the blocks.
- 5.4.1.3 Wide: ~50 m (5 span ranging from 9 to 10 m)
- 5.4.1.4 Front corridor: 5 m wide connecting the blocks.
- 5.4.1.5 Poles height: minimum 5.00 m.
- 5.4.1.6 Vents: top vents 20% of the roof area.
- 5.4.1.7 Poles: steel galvanized.
- 5.4.1.8 Cover specifications:
 - a. Roof: polyethylene film (200 micron, UV additive, anti fog treated).
 - b. Top vents: insect proof screen 20/20.
 - c. Sidewall and front walls: insect proof screen 20/20.
 - d. Front corridor: insect proof screen 20/20.
- 5.4.1.9 Bolts and nuts: zinc coating.
- 5.4.1.10 Fixing devices: only bolts, nuts and clips, no welding allowed for installation.
- 5.4.1.11 Minimum crop load: 20 Kg/m².
- 5.4.1.12 Withstanding gust of wind: minimum 130 Km/h.

5.4.2 Equipments:

- 5.4.2.1 Fully equipped water distribution plant.
- 5.4.2.2 Fully equipped drip irrigation plant, No. 8 drip lines per span.
- 5.4.2.3 Crop hanging wires: No. 8 wires per span.

5.5 ITEM 5:

~ 1,750 m² of nethouse, water reservoir.

5.5.1 Structure:

- 5.5.1.1 Type: net house, chapel or Canary type.
- 5.5.1.2 Long: ~ 70 m.
- 5.5.1.3 Wide: ~ 25 m.
- 5.5.1.4 Poles: steel galvanized, preferably only on the perimeter.
- 5.5.1.5 Cover specifications roof and sidewalls, form outside through inside: aluminum screen 75% + insect proof screen 20/20.

5.5.2 Equipment:

- 5.5.2.1 Water reservoir impermeabilization:
 - a. No. 2,000 m² black polyethylene film for water reservoir, minimum 0.40 mm thickness.
 - b. Glue and accessories for cutting and gluing.
 - c. No. 2,000 m² black mulching fabric.

5.6 ITEM 6:

Auxiliary equipments:

5.6.1 Water pumping station:**5.6.1.1** It must supply water to:

- a. Healing and workshop area (Item 1).
- b. Cultivation area (Item 2).
- c. Sowing and storage area (Item 3).
- d. Greenhouses for tomato cropping (Item 4).
- e. In addition it must be set to match the future extension of the nursery, healing and workshop unit PHASE II, cultivation unit PHASE II, III and IV.

5.6.1.2 It must include, among the others, the following equipments:

- a. No. 2 submerged pump for 60 m³/h each, including piping for No. 2 wells 150 m deeps and 250 m far from the water reservoir.
- b. No. 2 pumps, in line, fitting the greenhouses for tomato cropping.
- c. No. 2 pumps, in line, fitting the nursery installation.
- d. Sand filters and discs filters with automatic flushing.
- e. Switchboard, sensors and cabling.
- f. Fully equipped computerized fertirrigation station for tomato cropping greenhouses.
- g. Piping and accessories as required.

5.6.2 Diesel oil power generator: minimum 75 KW. Switchboard and cabling as required, diesel oil tank ~ 1 m³, copper piping linkage, filters and valves as required.**5.6.3 Electric plant:** all electric device, cabling, electrical accessories must fit EU norm.**5.6.3.1** Power supply: 380 V, 50 Hz, three phase.**5.6.3.2** No. 25 sockets 380 V three phase.

- a. Cultivation units (Nursery): No. 3.
- b. Sowing area (Nursery): No. 2.
- c. Storage area: No. 1.
- d. Truck loading area: No. 2.
- e. Cropping greenhouses: No. 6 (one at each greenhouse block entrance).
- f. Water pumping station: No. 2.
- g. Water boiler, power generator and central switchboard room: No. 1
- h. Healing unit (nursery): No. 3.
- i. Grafting workshop unit (Nursery): No. 2.
- j. Sowing area (Nursery): No. 2.

5.6.3.3 Additional electric wires (no sockets):

- a. To the sowing machine: type 5x3.
- b. To the germination chamber: type 5x2.5

5.7 ITEM 7:

Technical supervision for installation: in Agadir (Morocco), for a length of time adequate for the complete installation of green and net houses and auxiliary equipments. The final beneficiary will provide qualified and low skilled workers for in the quantity required by the supplier. The supplier must provide job description and quantity 30 days before equipment delivering.

5.8 ITEM 8:

Training and technical assistance for grafted tomato seedling production. During one production season (May – September), consisting of, at least, No. 9 in site visit. It

includes the agronomical management of seedlings rising and technical management of structures and equipments. Provide a short work plan.

5.9 ITEM 9:

Manuals and technical information: the contractor shall provide technical manuals in French (No. 3 copies), 60 days before delivering, including:

- 5.9.1 Ground leveling, drainage plan and layout.
- 5.9.2 Foundation design and specifications.
- 5.9.3 Packing list with reference to labeling.
- 5.9.4 Drawing, clearly reporting reference to labeling.
- 5.9.5 Detailed installation procedures for greenhouses structures and equipments.
- 5.9.6 Devices list for installation purpose.
- 5.9.7 Total electric power required.

6. Delivery:

The contractor shall deliver the equipment no later than 90 days after order confirmation.

7. Language of the proposal:

All proposals shall be written in English.

8. Currency of the proposals:

All proposals must be quoted in United States dollars and the contract will be awarded in this currency.

9. Body certifying quality and delivery:

For payment purposes, the contractor has to request to the National Project Coordinator to issue a statement certifying quantities and quality of equipments delivered. The Project Coordinator has to mail the statement to UNIDO. The contractor has to attach a copy to the bill.

10. Proposal formulation and cost breakdown:

The financial proposal must be supported by a detailed technical description of each item. To facilitate the technical and financial evaluation, in addition to the technical description, please fill out the table below.

Notice:

- 10.1 Greenhouses area: within the flexibility given for modules wideness and length, greenhouses areas should not exceeded $\pm 3\%$ of the requested area.
- 10.2 For all electric equipments: quote including switchboard/s, sensor/s and accessories.
- 10.3 For the electric plant: wires and accessories must be quoted as bulk (point No. 30).
- 10.4 For the micro tunnels sprinklers plant: pipes, junctions, valves, sprinklers and all related accessories must be included at the point No. 5 of the table.
- 10.5 For the water plant for tomato cropping greenhouses: quote main piping at the point No. 18 and dripping line at the point No. 19 of the table. Pumping plant will be included in point No. 24.
- 10.6 For the nursery water plant: pipes and accessories (valves, junction, etc.) must be quoted

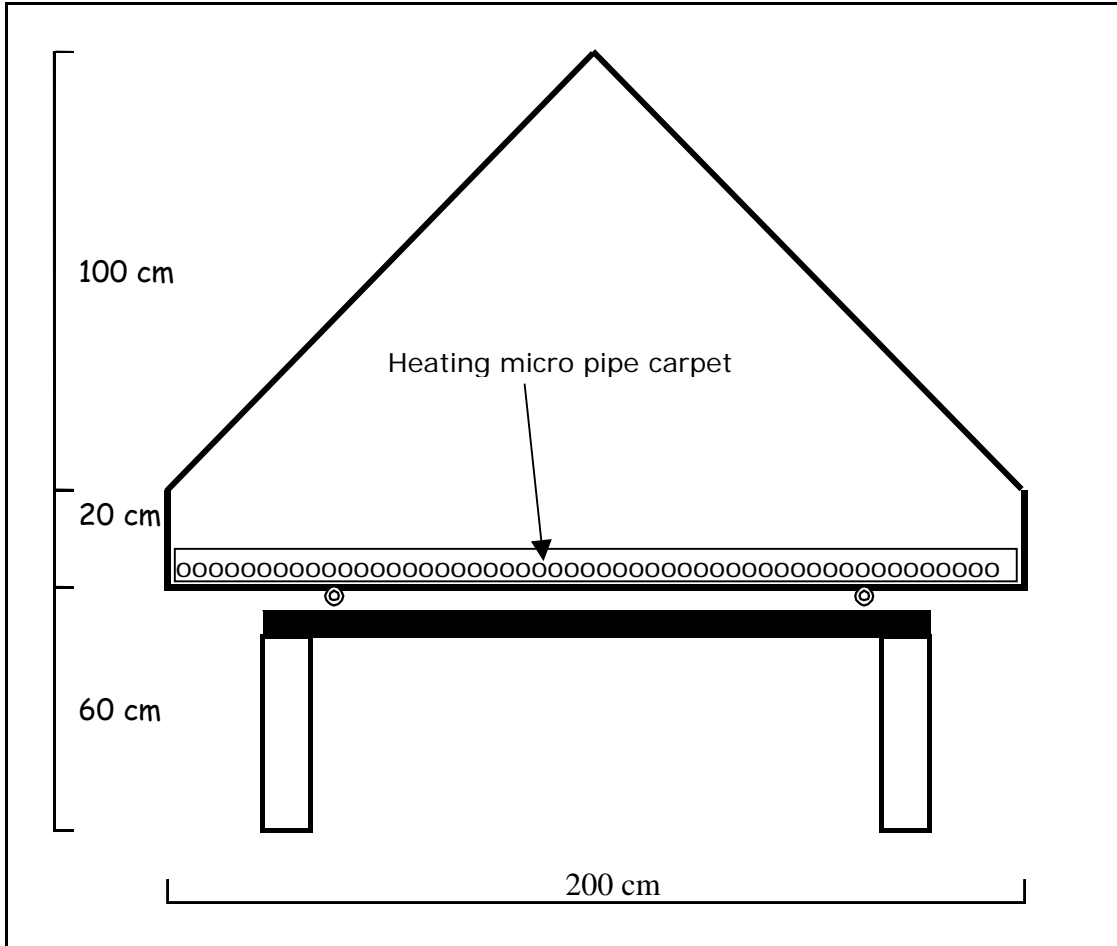
as bulk (point No. 30).

- 10.7 Any alternative proposal, beside the present terms of reference, will be carefully evaluated.
- 10.8 UNIDO keeps the right to withdraw any of the items of the present terms of reference accordingly to budget and/or technical constraints.

No.	ITEM	COST US\$	References paragraph on the technical description
1	Item 1: ~1,500 m ² of greenhouses grafted seedlings production		
2	Inner aluminum screen		
3	Cooling plant		
4	Exhaust fans		
5	Ground heated micro tunnels - rolling benches, including sprinklers, heating plant, and water boiler		
6	Four wheel trolleys		
7	Black mulching fabric		
8	Item 2: ~ 2,500 m ² of fully equipped greenhouses for the seedlings rising		
9	Overhead irrigation trolleys		
10	Water plant		
11	Horizontal airflow fan (HAF)		
12	Misting system		
13	T rail frame benches for suspended trays cultivation		
14	Black mulching fabric		
15	Inner aluminum screen		
16	Item 3: ~750 m ² of greenhouses for auxiliary equipments and storage		
17	Item 4: six (6) blocks of 5,000 m ² fully equipped greenhouses for tomato cropping, total area ~30,000 m ²		
18	Fully equipped water distribution plant		
19	Fully equipped drip irrigation plant, 8 drip lines per span		
20	Crop hanging wires: No. 8 wires per span.		
21	Item 5: ~1,000 m ² of net-house water reservoir.		
22	Water reservoir impermeabilization		
23	Black mulching fabric		
	Item 6: auxiliary equipments		
24	Water pumping station		
25	Diesel oil power generator		
26	Item 7: technical supervision for installation		
27	Item 8: technical assistance for grafted tomato seedling production		
28	ITEM 9: manuals and technical information:		
29	Water plant: piping and accessories.		
30	Electric plant: cabling and accessories.		
TOTAL COST			
...	Any alternative option of the above		
...	Any alternative option of the above		

ANNEX I

Movable heated micro tunnel



Estimate amount of the furniture: 500,000 US\$.

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