Fertigation Infrastructure System

Structural designs for Controlled Environment Fertigation (CEF)

A. Dome: Have concrete base footing; 4.2 m H; 6 m W; 30 m long (L); 400-450 planting capacity. See Fig. 1.

B. Jack Roof: Have concrete base footing; 4.3 m H; 6 m W 30 m L; 400-450 planting capacity. See Fig. 2.

C. Gable: Have concrete base footing; 6.3 m H; 6.4 m W; 30 m L; 400-450 planting capacity. See fig. 3.

CEF Cost Comparison

<table>
<thead>
<tr>
<th>Types of Design</th>
<th>Cost (P/sq. m)</th>
<th>Cost (P/Unit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(6 m x 30 m)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>A. Dome type</td>
<td>P1,300 - P1,400</td>
<td>P 234,000 - P 250,000</td>
</tr>
<tr>
<td>B. Gable</td>
<td>P1,400 - P1,500</td>
<td>P 250,000 - P 270,000</td>
</tr>
<tr>
<td>C. Roof Jet</td>
<td>P 1,500 - P1,600</td>
<td>P 250,000 - P 290,000</td>
</tr>
</tbody>
</table>

References:
- Training Course on Advanced Fertigation Technology To Increase Crop Production. Vivatel Hotel, Kuala Lumpur and Heritage Hotel Cameron Highlands, Pahang, Malaysia: Association of South East Asian Nations (ASEAN), Ministry of Agriculture, Forestry and Fisheries (MAFF), Jabatan Pertanian, May 22 - June 4 2016.

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www.freshplaza.it
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http://edoc.hu-berlin.de/

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“Spoon feeding” approach of fertilization
What is fertigation?

Fertigation is the application of nutrients through irrigation systems, a contraction of fertilization and irrigation to supply the plant with its daily demand of water and nutrients/fertilizers as required by its specific growth stage throughout its development.

It is usually practiced on high-value crops such as vegetables, turf, fruit trees and ornamentals.

The units of fertilizer application are calculated based on the fertilizer requirement of individual plant. This is expressed in units of milligram (Nitrogen, Phosphorus or Potassium) per day over the entire growing period.

**Fertigation vs. Conventional Fertilization (CF)**

<table>
<thead>
<tr>
<th>FERTIGATON</th>
<th>CF</th>
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</thead>
<tbody>
<tr>
<td>Fertilizers applied with the water</td>
<td>Fertilizers applied separately from the water</td>
</tr>
<tr>
<td>Nutrients are dissolved and taken up in the root zone</td>
<td>Nutrients are not dissolved in the dry zones where the soil is not wetted</td>
</tr>
<tr>
<td>High fertilization efficiency</td>
<td>Low fertilization efficiency</td>
</tr>
<tr>
<td>Preferred method to correctly apply fertilizers to irrigated crops</td>
<td>The benefits of Micro Irrigation System (MIS) are not expressed</td>
</tr>
</tbody>
</table>

**Types of Fertigation**

- **Hanging Open Fertigation**
  - This technique is suitable for problematic areas such as acidic soils condition, peat soils, ex-tin mining area,bris soils and those areas subjected to flash flood.
  - Able to reduce attack of soil borne diseases, damage due to flash flood and longer crop harvesting period compare to the conventional method.

- **Nutrient Film Technique**
  - Very shallow stream of water containing all the dissolved nutrients required for plant growth is re-circulated by a pump past the bare roots of plants in a watertight gully. Unused nutrients flow back into the tank for growing plants.

- **Fertigation with Rain Shelter**

- **Controlled Environment Fertigation (CEF)**

**Benefits of Fertigation**

| More Efficient Use of Nutrients | Nutrient use efficiency by crops is greater under fertigation compared to conventional application of fertilizers to the soil |
| Less Water Pollution | Fertigation helps lessen pollution of water bodies through the leaching of nutrients such as N and potassium (N) out of agricultural farming |
| High Resource Conservation | Fertigation helps in saving of water, nutrients, energy, labor and time |
| More Flexibility in Farm Operations | Fertigation provides flexibility in field operations. E.g. nutrients can be applied to the soil when crop or soil conditions prohibit entry into the field with conventional equipment |
| Efficient Delivery of Micronutrients | Fertigation provides opportunity for efficient use of compound and ready-mix nutrient solutions containing small concentrations of micronutrients |
| Healthy Crop Growth | When fertigation is applied through the drip irrigation system, crop foliage can be kept dry thus avoiding leaf burn and delaying the development of plant pathogens |
| Effective Weed Management | Fertigation help reduce weed menace particularly between the crop rows. Use of plastic much along with fertigation through drip system allows effective weed control in widely space crops |
| Effective Use of Undulating Soils | The ability of micro-irrigation system to irrigate undulating soils makes it possible to bring such land under cultivation, which otherwise remains as wastelands or used as pasturelands |
| Reduce Soil Compaction | In micro-irrigation system reduced need for surface traffic movement during irrigation and nutrient application helps to reduce soil compaction |

**System Components**

**Suction Segment**

- Water Source
- Pump
- Filter
- Fertilizer mixture/injector
- Control panel/timer
- Control valve

**Delivery Segment**

- Piping system
- Control valve
- Nozzle