HYDROPONIC DATA SHEET. STRAWBERRY.

SYSTEM.
This crop can be grown in either the NFT (nutrient film technique) or the media run to waste or media recycled systems.

1/. NFT system.
Gullies should not exceed 15 meters in length and should have a fall of at least 1 in 40 down the 15 meters.
Gullies should be rigid PVC in 100mm by 50mm or 150mm x 75mm dimensions.
The preferred system uses the rigid PVC 150 x 75mm type for best results.
Nutrient flow rate down the gully should be a maximum of 1 liter of nutrient per minute.
CF range is 12 - 16 at planting rising to 22 - 24 at cropping.
pH range is 6.0 to 6.5 (auto systems set at 6.3 pH)
It is essential to have good oxygenation of the nutrient, the easiest and cheapest way to ensure this is to use a venturi on a bypass from the pump back into the tank.

2/. Media systems.
The crop can be grown in a wide variety of different medias, Pumice, Course washed river sand, Rockwool, Perlite, or any inert sterile material of a grain size to allow air to permeate down to the roots. In the NFT system the plants can be put in bare rooted.
When recycling it is good practice to have fine filtration of the nutrient to avoid blocking of the feeder pipes.
CF and pH ranges as for NFT, again with good oxygenation of the nutrient.
Monitor run-off CF and pH to ensure the correct root zone conditions apply.

Temperatures.
Maintain the following temperatures until the end of the crop.
NFT systems.
Nutrient; Minimum 18 degrees C daytime and 16 C night.
Ideal 22 C to 24 C
Maximum 25 C
Air; Minimum night 10 degrees C.
Minimum day 18 C
Maximum vent temp 28 C.
Note.....Some varieties may need different temperatures to these, so check with the plant supplier for the correct temperatures for the variety being grown.

Pollination.
Insects and air movement all assist in pollination, some varieties require assistance, asks your seed merchant. Minimum air temperatures are required to set good fruit.

Diseases.
Main ones to watch for are, Black spot, Grey mould (Botrytis), Leaf blight, and Powdery mildew.
Good air movement and keeping the humidity down on cool damp days assists in a reduction of diseases. Potassium Silicate added to the nutrients can assist in fungal protection.

Insects.
Mites are the main threat; predators can be used with a totally integrated pest management program. E.g. Spidex for the Two Spotted Red Mite.

Root Problems.
Use only clean water, preferably treated with the likes of Ozone, to reduce the introduction of root diseases such as Phytophthora and Pythium. If these occur use the recommended
procedures to clean out the system.

**Nutritional requirements.**

Nutrients should contain the following minerals.

Nitrogen, Potassium, Phosphorous, Calcium, Magnesium, Sulphur, Sodium, Chloride, Silicon, Iron, Manganese, Boron, Copper, Zinc, Molybdenum.

**Leaf analysis:**

<table>
<thead>
<tr>
<th>Element</th>
<th>Minimum</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nitrogen</td>
<td>2.6%</td>
<td>3.5%</td>
</tr>
<tr>
<td>Potassium</td>
<td>1.0%</td>
<td>2.0%</td>
</tr>
<tr>
<td>Magnesium</td>
<td>0.25%</td>
<td>0.4%</td>
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<tr>
<td>Iron</td>
<td>100 ppm</td>
<td>200 ppm</td>
</tr>
<tr>
<td>Boron</td>
<td>30 ppm</td>
<td>100 ppm</td>
</tr>
<tr>
<td>Zinc</td>
<td>30 ppm</td>
<td>80 ppm</td>
</tr>
<tr>
<td>Phosphorous</td>
<td>0.25%</td>
<td>0.35%</td>
</tr>
<tr>
<td>Calcium</td>
<td>0.7%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Sulphur</td>
<td>0.15%</td>
<td>0.35%</td>
</tr>
<tr>
<td>Manganese</td>
<td>200 ppm</td>
<td>500 ppm</td>
</tr>
<tr>
<td>Copper</td>
<td>5 ppm</td>
<td>12 ppm</td>
</tr>
</tbody>
</table>

Plant growth promotants are often added to the nutrients to produce quality growth during periods of poor conditions, e.g. in winter under low light.

The growth promotants, Agronomix at 20 gms per 20 Kg of dry powder mix, and SGP at 500 mls per 20 Kg dry powders may be added to drum 'B'.

Nutrient formulation is blended to suit the water supply, so a water mineral analysis is essential for optimum formulation.

Downwards pH correction is usually with Phosphoric Acid, but there may be situations where Phosphoric/Nitric Acid mixes are used, or even straight Nitric Acid at times, especially if the water supply has a high pH, above 7.8 for example.

Upwards pH correction is always carried out with Potassium Hydroxide. Common name Caustic Potash.

Note… all pH correctors are added in a very weak form; never use full strength acid or alkali to adjust nutrient solution. Dilutions of 500 to 1 with water are normal.

**Nutritional problems.**

Regular nutrient analysis and leaf analysis may be required to assist in producing top yield, especially in the first crop, or crops.

With NFT systems or any re-cycling system, it’s often advantageous to flush out the nutrient tank regularly to avoid a build up in toxic materials or to remove a nutritional mineral imbalance. Also if the nutrient gets dirty and you don't fancy drinking it, then flush it out. Plants respond to clean nutrient and there will be far fewer problems from diseases if nutrient is regularly changed. Only nutrient analysis will show how long a specific system can run for until it’s out of balance; however 4 weeks is usually the maximum time between flushing.

Remember, don't put cold water into the tank and circulate immediately, raise the temperature to that required in the root zone before turning on the pump.

For run to waste crops this is also an essential, don't chill off the roots on a hot day or freeze them in winter. Pre-heat the water to be applied.

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**Points to note.**
The production of quality and quantity of fruit from strawberries is very dependent on the
quality of the plant being used. Main things to remember are;

1. Propagation,
There are four methods, by runners, Division of crowns, Tissue culture, from seed.
Only the first three produce plants that are true to type. Seedlings can vary greatly from the
parent plant.
The main types of plants used by commercial growers are from runners.
Runners are the daughter’s plants produced by the mother plant; they are produced in the
warm, long days of summer and early autumn. Runner production is a relatively inexpensive
way to produce new plants. Supplies of virus and disease free runners are available in many
countries, when purchasing runner plants, only buy those that are certified from clean stock
plants.
The method of production of new plants by division of the crowns of older plants can have
some drawbacks, disease from the last crop, and division damages the crown and new
diseases can get into the plant.

2. Variety,
Discuss with your markets, which varieties they prefer, and ask your plant suppliers which are
the most popular in your area.
Should they be cool stored or fresh runners?
There are many varieties available; the main consideration is to determine what varieties will
perform in your area, under your climatic conditions.
There are short day varieties, that fruit in short daylight conditions, less than 12 hours light;
they have a typical cycle of, flower, fruit, and runner.
Daylight neutrals are not affected by daylight length, and will continue to produce flowers
under all daylight conditions, providing temperatures are not too high, or too low. These plants
have a different cycle; they flower, fruit and produce runners simultaneously.
The third type is ‘Ever Bearing’ varieties, these have a cycle of, flower, then fruit, then flower
and fruit, with very few runners being produced.

3. Chilling.
Strawberry plants like many temperate berry crops have a need for chilling the plant in order
to start the cycle. If the chilling is done correctly, by normal autumn, winter and spring
conditions, then the plants grow up and leaf up vigorously, then flower in a definite peak, fruit
and move into runner production. If chilling is not done correctly, then the plants are not as
vigorous, and even, resulting in erratic flowering. Each variety has a certain chilling
requirement, and will perform best in areas where this is satisfied. Cultivars with little chilling
requirement perform best in the warmer coastal areas. Those with the highest chilling
requirement perform poorly in coastal warm areas, but produce well in cooler climates.

4. Temperatures.
In addition to chilling, there is a requirement for both air and root temperature to be within the
correct range. Air temperature can influence flowering response to daylight length.
When warm and hot conditions occur, a temperature of 25°C or over, flowering is inhibited,
regardless of daylight length. Air temperature also influences the timing of fruit production by
its influence on plant growth. After flower buds have formed, some plant growth is needed to
produce visible flowers and fruit, in cold areas plants can become dormant even after flower
buds have formed, if the air temperature drops too low, the flowers will not develop until the
plant is exposed to an increase in temperature. A minimum air temperature in daylight hours
of 18°C is usual for most varieties (check with supplier) and 16°C at night, with root
temperature never below 18°C.