

Hydroponics for Everyone



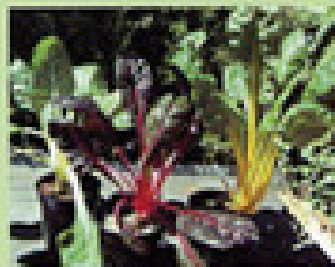
A practical guide to gardening
in the 21st Century

Completely
updated

4th
EDITION

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A HYDROPONIC SYSTEM



easy step-by-
step guides

advice
on
growing
mediums



efficient
and
inexpensive
containers



Dr. Struan Sutherland

Contents

Dedication	iv
Acknowledgments	iv
Prologue: Confessions of a despairing gardener and how a dentist stopped the heartbreak	viii
Introducing Hydroponics	x
Preface	xii
Introduction: A Brief History of Hydroponics	xvi
1 How a Plant Works – Its Basic Requirements	1
Water	2
Water-soluble Minerals	4
Warmth and Sunlight	4
Table 1 Some optimum root zone temperatures	6
Air	6
Disease and Pest Control	6
Shelter and Support	6
How a Plant's Needs Are Satisfied by Hydroponics	6
2 Plant Food and Nutrient Solutions	8
Essential Minerals	8
Table 2 Essential minerals, their role in plant growth and signs of deficiency or excess	9
Table 3 Concentration of nutrient elements in hydroponic solutions	11
Quality of Water	12
Testing Nutrient Solutions	12
Table 4 Optimum pH range for growth of some common plants	14
Preparation and Replacement of Nutrient Solutions	14
3 Support Mediums for Hydroponic Plants	17
Sand	17
Scoria	17
Perlite	18
Vermiculite	19
Growool (Horticultural Rock Wool)	20
Expanded Clay Balls	23
Other Mediums	23
Table 5 Some advantages and disadvantages of mediums	23
What Medium Should One Use?	24

4 Types of Hydroponic Systems	25
Containers and Fittings for Hydroponic Systems	25
Non-recycling Systems	31
Recycling Systems	38
Other Hydroponic Systems	45
What System Should One Use?	49
Purchasing Hydroponic Kits	49
5 Germinating Seeds and Planting Out	50
Advantages in Starting from Seed	50
Methods of Germinating Seeds	50
A Simple Incubator for Germination	53
Table 6 Optimum temperatures for germination of seeds	53
Introducing Seedlings and Plants to the System	54
Sources of Seeds and Plants	56
Swapping of Seedlings	57
Sharing of Seeds	57
6 What to Grow	58
Choice of Mediums and Containers	58
Vegetables	59
Table 7 Selection of plants, mediums and containers	60
Herbs	69
Strawberries	73
Flowers	78
7 Maintenance of Hydroponic Systems and Care of the Plant's Environment	81
Observation — Look, Listen, Sniff and Touch	81
Supply of Nutrient Solution	82
Avoiding a Dry Atmosphere	84
Plant Grooming and Training	84
Harvesting of Crops	84
Removal of Old or Dying Plants	84
Replacement of Plants	84
Root Penetration	84
Pest and Disease Control	86
Protection from Excessive Heat	86
Heating the Plant's Environment	87
Use of Artificial Lights	88
Maintenance of Records	89
Annual Clean-up	90
Disadvantages of Glasshouses and Igloos	90

8 Pest and Disease Control	91
Isolation of Clean Plants	91
Hot House and Igloo Tools, etc.	92
Plant Diseases and Pests	92
Companion Planting	93
To Spray or not To Spray?	94
Biological Control of Insects	97
Manufacturers' Instructions and Safety Precautions	98
9 Getting Started	100
Basic Equipment	100
Non-recycling Systems	101
Recycling Systems	107
Epilogue: The happy hydroponicer – the author's system at work	112
Establishing the Hydroponic Environment	113
Setting up the Hydroponic Plumbing	114
Nutrient Reservoir	115
Selection and Installation of the Electric Pump	115
Power Supply	116
Path of the Nutrient Solution	116
Nutrient Drainage (Return) Pipe	118
Containers and Mediums Used	118
Nutrients Used	120
Cooling and Ventilation of the Environment	121
The Tomato Shed — a Purpose-built Unit	123
Summary of Results	125
Appendix: Some hydroponic suppliers in Australia and New Zealand	129
Hydroponic Suppliers	129
Suppliers of Seeds	136
Supplier of Carnation Plants	136
Supplier of Greenhouse Covers and Shadecloth Fabricators	136
Supplier of Ludvig Svensson Screens	136
Supplier of Plastic Fittings	136
Part-time Courses in Hydroponics	137
Hydroponic Societies	137
Hydroponic Consultants	138
Bibliography	139
Index	140

constantly reminds me of the building power of photosynthesis as it ticks over quietly each day.

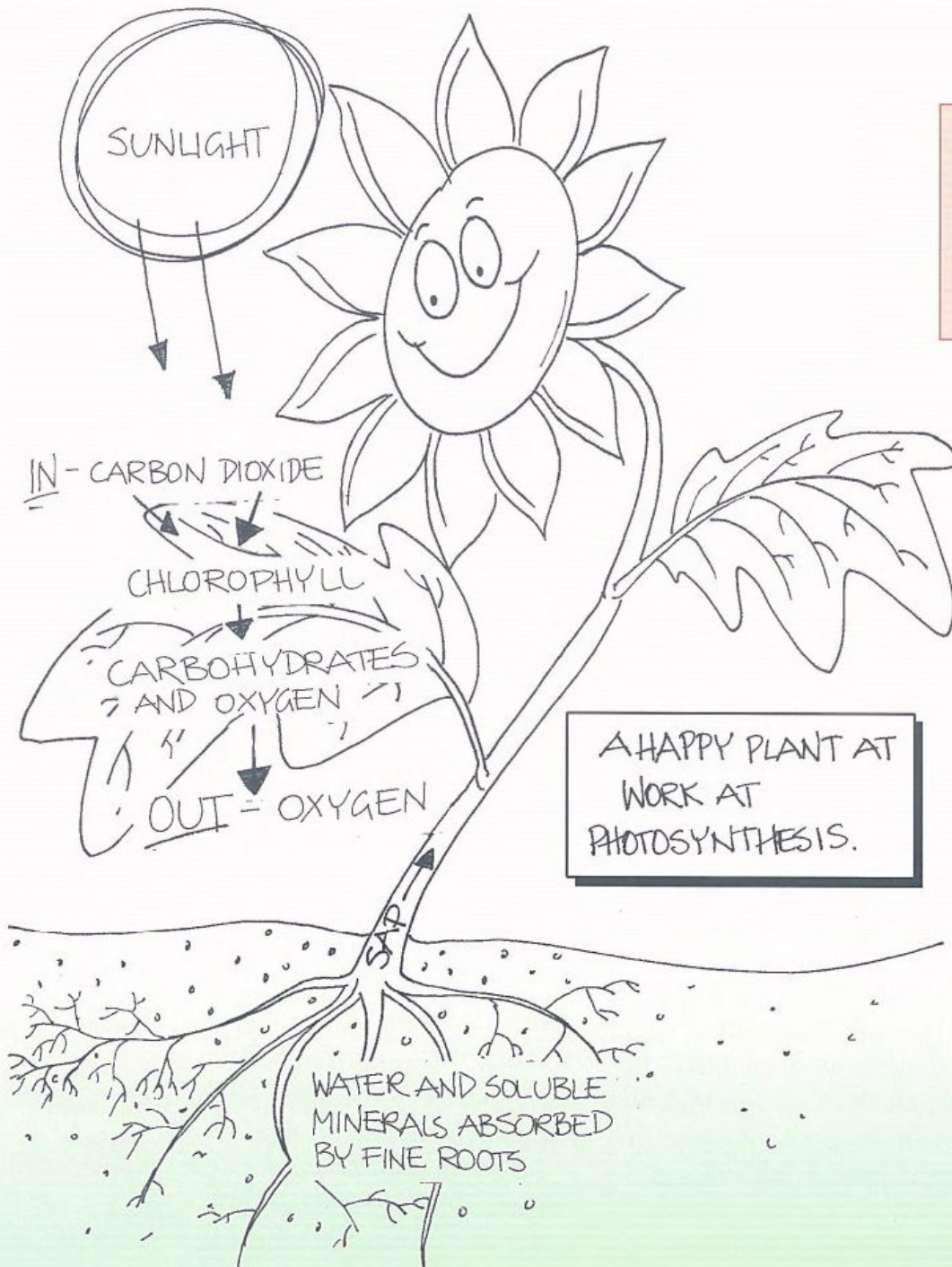
Now that we are experts on the inner secrets of plant growth, let's start again at the bottom and enlarge on some of the ingredients.

Water

This should be adequate otherwise the plant will spend most of its energy extending its roots to keep

up with demand. Lack of water may lead to a huge and busy root system and a small miserable plant above the ground. On the other hand, the roots can literally drown if drainage is so poor no air can regularly get to the root hairs. The miles of tunnels around the roots made by the noble earthworm help keep the soil well ventilated and drained.

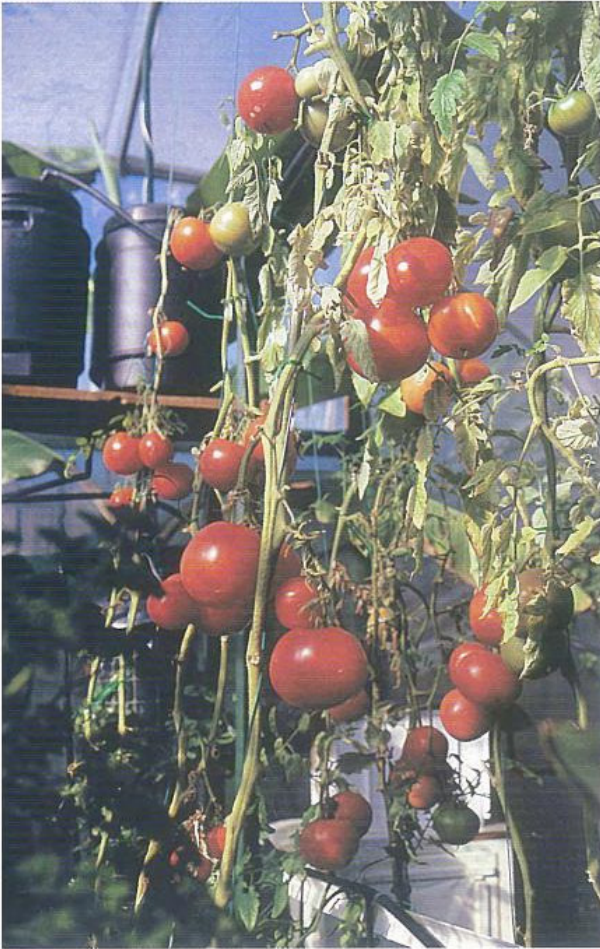
Plants use up a surprisingly large quantity of water. For example, a fast-growing tomato plant processes some 2.5 litres (0.66 US gal) per day and



HYDROHINT

Good ventilation keeps plants healthy.



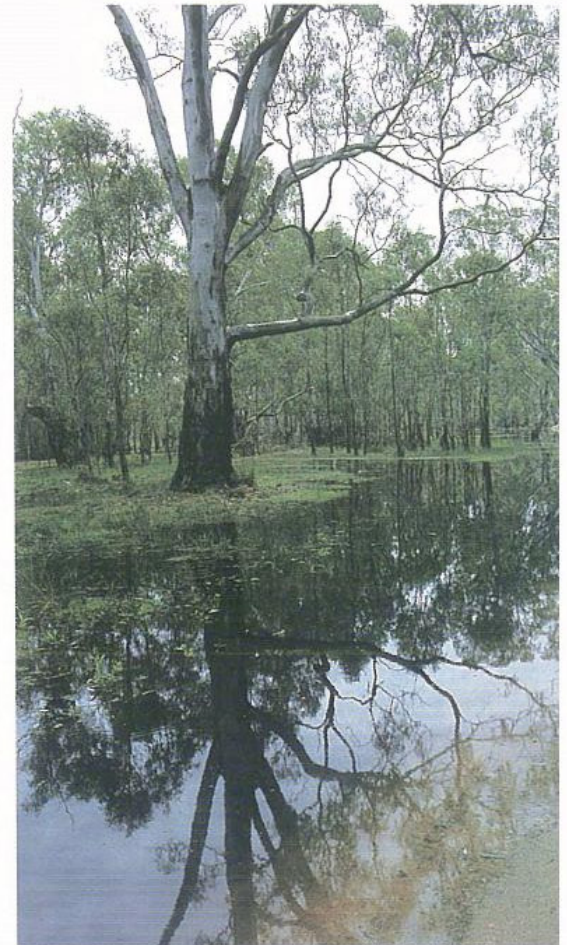


A rare sight in Melbourne. A crop of tomatoes ready for harvesting in July.



A simple recycling system, see page 38, this salad box contains lettuce, radishes and spring onions.

A giant river red gum from the Barmah Forest, Victoria.



This wilting basil shows you what happens if you forget to water a plant!

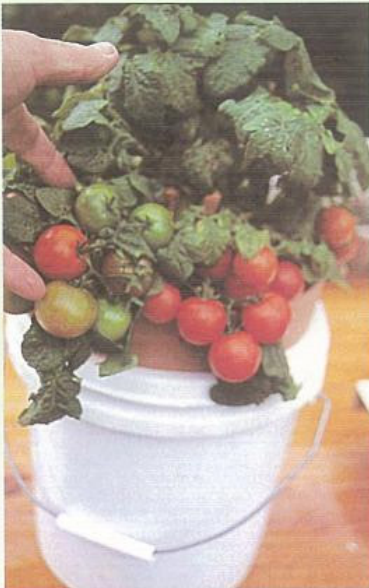


Table 2 ESSENTIAL MINERALS, THEIR ROLE IN PLANT GROWTH AND SIGNS OF DEFICIENCY OR EXCESS

	<u>SIGNS OF DEFICIENCY</u>	<u>SIGNS OF EXCESS (toxic effects)</u>	
Nitrogen (nitrate and ammonium)	Plants spindly. Leaves small and yellowish. Parts of plant may turn purple. The new leaves of tomatoes point vertically. Older strawberry leaves may become red.	Plant too vigorous, becomes very leafy with dark green leaves, fruit ripening delayed. Susceptible to pests. Ammonium excess can cause root damage if bacteria are inadequate.	
Phosphorus	Plants are small and dark green. Lower leaves become yellow and may have purplish tinge as phosphorus is drawn from them to the new growth. Leaves curl backwards and droop. Fruiting is poor and root system reduced.	No direct toxicity. Reduced copper and zinc availability.	Phosphorus-deficient tomato. (Courtesy Kevin Handreck)
Potassium	Plant growth slows, older leaves develop brown mottling. Flowers are fewer and plant is prone to fungus.	Uncommon to absorb a toxic amount. A secondary manganese deficiency may occur.	
Calcium	Plant stunted with crinkled leaves. Youngest parts die and bloom falls. Calcium-deficient tomatoes may get brown spots on blossom end of fruit. These spots may decay (blossom rot) particularly with sudden onset of hot weather.	No specific changes.	Potassium-deficient petunia. (Courtesy Kevin Handreck)
Sulphur	Uncommon. Young leaves become yellow with purple changes at leaf bases.	Slowed growth and small leaves.	
Iron	A common deficiency. New growth pales and blossom drop occurs. Yellowing initially seen between veins, and leaves may die from the edges. In tomatoes this deficiency may occur when fourth or fifth cluster is developing and nutrients are being diverted from rest of crop.	Very uncommon. Usually seen as black spots after spraying with nutrient.	Stocks showing sulphur deficiency. (Courtesy Kevin Handreck)
			
			Iron-deficient hydrangea. (Courtesy Kevin Handreck)



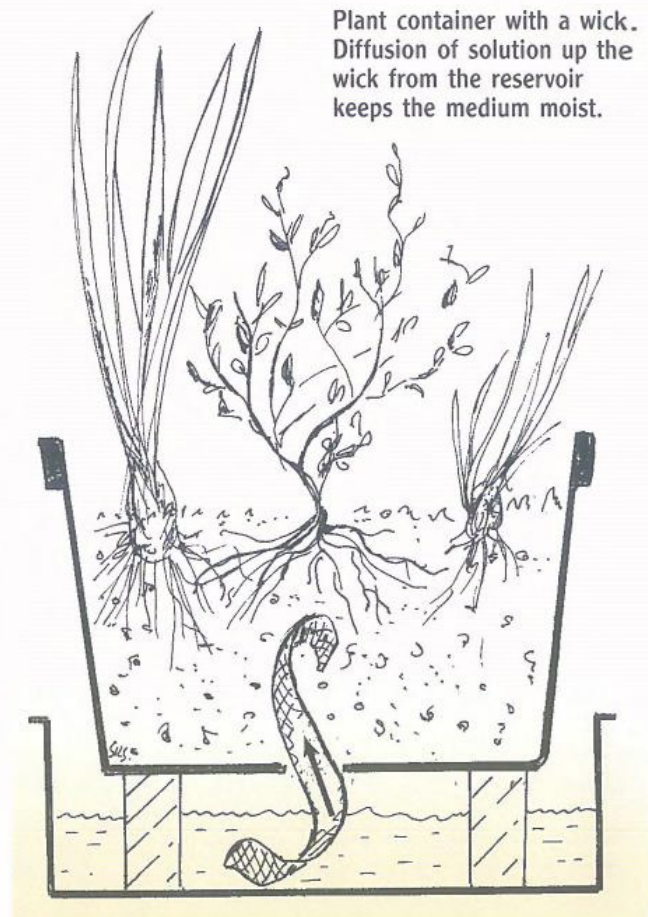
E The tomato plant's roots were washed carefully prior to planting.



F This is the established plant two months later.

Setting up a Wick System

The photographs show how a wick system can be used to grow cherry tomatoes successfully. It was too late in the season to obtain young plants, so it proved a good example of how an advanced plant can be successfully transferred from its normal earth medium to a hydroponic system.



Plant container with a wick. Diffusion of solution up the wick from the reservoir keeps the medium moist.

The Auto-pot

Jim Fah's 'Smart-valve' — automation without electricity

The development of the Smart-valve looks set to give home hydroponics a great boost. This ingenious device releases nutrient fluid until it reaches a depth of some 30 mm (1 1/6 in) but does not allow the escape of further nutrient fluid until the plants have taken up nearly all the liquid. Because it does not maintain a stagnant pool of nutrient fluid at a constant level it mimics to some extent the flood and drain system.

The story of the Auto-pot's development and application is one of both inspiration and tenacity. In 1981 its inventor, an agricultural scientist called Jim Fah, was working in Malaysia raising gloxinia, beautiful flowering plants from Brazil, which need constant attention. Since he had to be away sometimes for several weeks, a method of regular feeding had to be devised.

Vegetables

Let us now consider some vegetables alphabetically, indicating which are the most suitable for growing hydroponically. Of course there is always room for experimentation and if you want to try any plant hydroponically, then go for it. Some additional notes and observations on plant selection and results can be found in Chapter 9 and the Epilogue.

Amaranth Spinach (Een Choi)

This Chinese vegetable grows very well in a perlite/vermiculite mixture. It has attractive red tinges to its leaves. The whole plant can be harvested or the tips of the larger plants taken off as required.

Asparagus growing in perlite in an old wooden laundry trough. The perlite is 30 cm (12 in) deep.



Artichokes (Globe or Jerusalem)

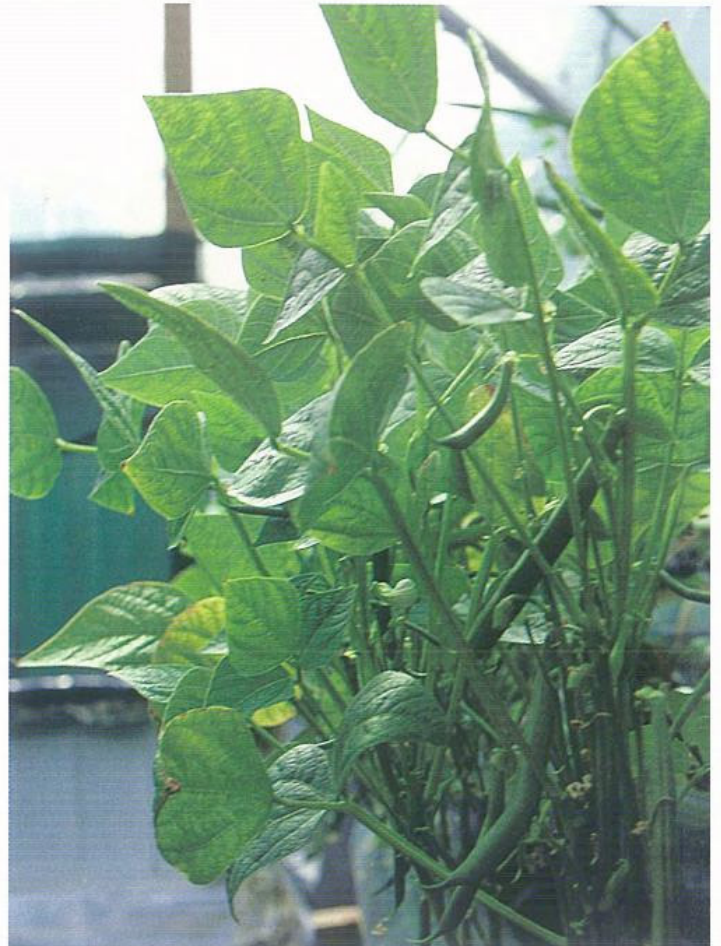
These grow very well in perlite and are especially tender.

Asparagus

Asparagus requires a couple of years before it produces a reasonable harvest and, in the meantime, occupies space and needs a bed at least 25 cm (10 in) deep. However, I have grown it successfully in plastic buckets with perlite as the medium (see Epilogue).

French beans growing in a length of drainage pipe which has been packed with granulated growool up to 30 cm (12 in) from the holes. Seeds are dropped

into the holes and germinate on the medium. This pipe has been in continuous use for three years with no medium change.



Biological Control of Insects

There are now a number of companies specialising in biological control which distribute, for example, predatory mites which make quick work of two-spotted mites. For details of the predators and the companies, contact your local Department of Agriculture.

Carnivorous Plants

For years I've kept carnivorous plants. These little pets require little attention other than a regular drink of rainwater or distilled water. Tap water can kill them as it often contains salts which accumulate over time, etc. They grow successfully in one part vermiculite to four parts of peat moss and need no feeding.

Although the venus fly trap dispatches many an insect, the sundews seem particularly effective at fixing whiteflies.

Australian television's top gardening personality, Don Burke, is transfixed by some of the author's carnivorous plants. He impressed the author no end by recording an off-the-cuff segment on them.



PLANT TRAPS



A This large pitcher plant in a bucket has a fatal attraction for insects.



B Veined throat of the waiting pitcher plant.

