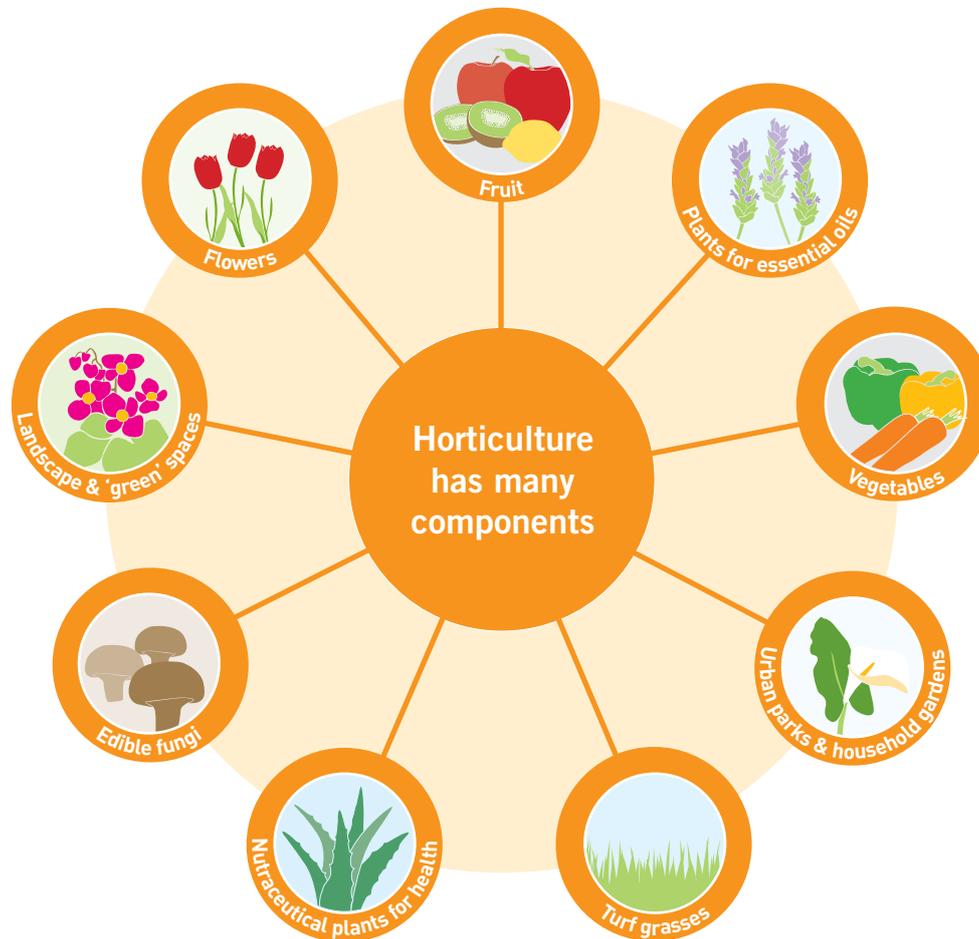


CHAPTER ONE

The Big Picture



Horticulturalists provide food to feed the world, beautify our neighbourhoods, decorate our gardens and give ambience and wellbeing by combining the energy of the sun with soil, seeds, water, and ingenuity.

Their enterprises range in size from the subsistence micro gardens of villages to huge commercial enterprises with large holdings of greenhouse and field crops and extensive orchards. They supply world markets through sophisticated supply chains delivering fruit and vegetables to your supermarket with FAO calculating this to be in excess of 2.4 billion tonnes (2009).

Horticulture is also parks, public gardens and reserves, sports fields and golf courses, trees, vegetables and flowers in urban and peri-urban communities, home gardens for food and beauty. Such facilities have aesthetic, sociological and psychological benefits for human kind. For many

people, flowers, bulbs, foliage and ornamental live plants are their picture of horticulture – so it should not be a surprise that global export trade in these exceeds US\$17 billion annually.

In the same region less sophisticated production with tiny, well tended plots of produce can be found alongside more elaborate businesses involving global scale investments in land and capital assets. Horticulture is conducted in diverse locations covering both tropical and temperate zones. Every day in every location horticulturalists face challenges with seed production, weather conditions, soil and fertiliser management, disease and pest control, product quality, packaging and storage, product traceability and the vagaries of promotion and marketing. With a mix of courage, enterprise and skill, horticulturalists deliver fruit, vegetables, plants and flowers to a demanding world.

Horticulture has exotic vibrant sub-cultures. Innovative thinking has led to new developments in production methods such as soilless hydroponic growing. Creativity has led to urban lifestyle gardens that show flair and originality – and add significant value to our world. New ideas continually inspire industry to meet future challenges and customer demands.

Horticulture is a growing economic powerhouse with a large economic footprint globally. It provides livelihoods and employment, increased incomes, and enhanced wellbeing and satisfaction to populations of virtually all countries.

It provides vital food for humanity bringing both health and nutritional benefits. In developing countries, most horticultural products are sold fresh with limited packaging and storage. In these countries it is increasingly being recognised that higher returns per unit effort and unit area from horticultural activities create jobs, especially for

women and youth, bring incomes to pay for education and for building sustainable communities. Given that the world population will reach nine billion by year 2045, it follows that food production and distribution must become more effective, more efficient and more sustainable.

Horticultural producers and the scientists who advise them, work with many other skilled people in the supply chain to get high-quality, perishable produce to markets for us all to enjoy and appreciate.

The satisfaction of producing quality produce is shared by those who produce the products, and the packing, sorting, and transport groups who get them safely to market, and by those who sell them typically in attractive presentations.

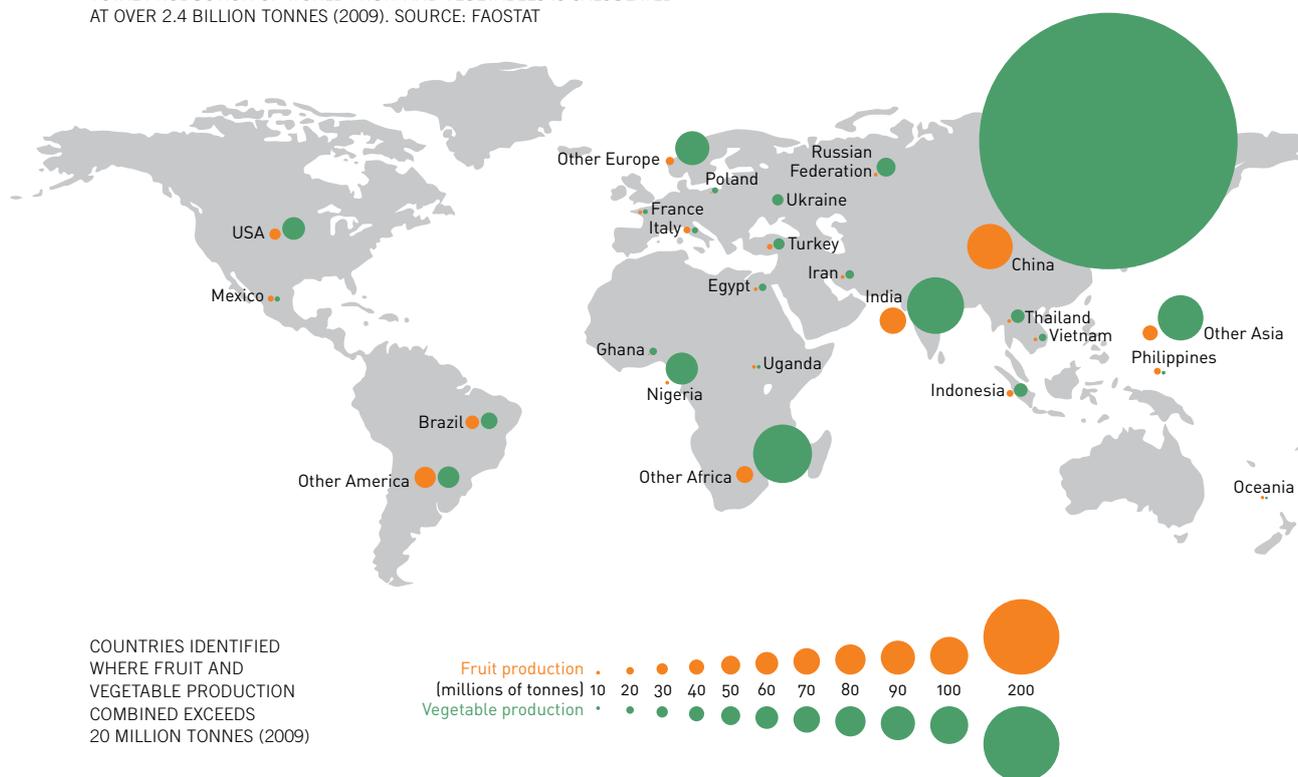
The benefits are to those who use and consume the wide diversity of horticultural products that are available year-round in many of the world's markets. Fruit, vegetables, flowers and 'green spaces' impact our lives in many ways.



Fruit, vegetables, flowers, gardens and landscape: the rich diversity of horticulture.

World production of fruit and vegetables

TOTAL PRODUCTION OF WORLD FRUIT AND VEGETABLES IS CALCULATED AT OVER 2.4 BILLION TONNES (2009). SOURCE: FAOSTAT



Of the world's production of fruit and vegetables, 42% is grown in China and India – more than one billion tonnes out of the total of 2.4 billion tonnes. China alone grows 38% of the vegetables and 19% of the fruit produced globally (tonnes measure).

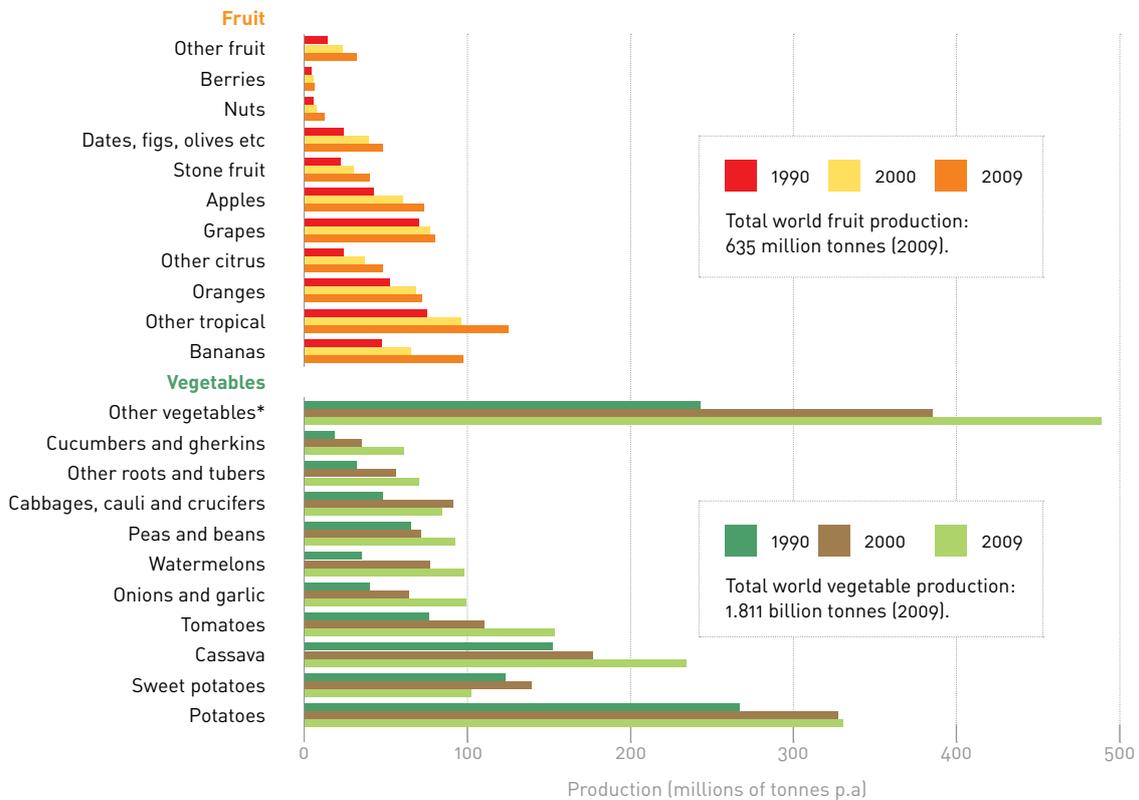
China produces 44% of the world's apple crop and 50% of the world's peaches and nectarines. India's largest volume fruit crop is bananas (27 million tonnes). This is 28% of global production.

Production in millions of tonnes (2009)	Fruit	Vegetables	Total
China	118	683	801
India	71	152	223
Nigeria	10	85	95
USA	29	61	90
Brazil	37	43	80
Indonesia	17	35	52
Russian Federation	3	48	51
Turkey	15	32	47
Thailand	9	34	43

The above nine countries between them produce 51% of the world's fruit and 65% of the world's vegetable crops.

World fruit and vegetable production (1990, 2000, 2009)

SOURCE: FAOSTAT



* Other vegetables include carrots, chillies, eggplant, lettuce, pumpkins and others.

The scale of world horticulture

World production of fruit and vegetables in 2009 was 2.446 billion tonnes (source: FAOSTAT).

Fruit

World production of fruit in 2009 was 635 million tonnes, an increase of 256 million tonnes (68%) in the 29 years since 1990.

The most remarkable increases have been in tropical fruit ('Bananas' and 'Other tropical fruit' in the graph), which increased from 122 million tonnes in 1990 to 222 million tonnes in 2009, an increase of 82%.

Vegetables

The shift from staple crops to leafy and other vegetables reflects a move towards more nutritious and balanced diets, bringing total world vegetable production in 2009 to an estimated 1.811 billion tonnes, a 65% rise since 1990.

In 1990, production of potatoes and sweet potatoes was estimated at 389 million tonnes and at 432

million tonnes in 2009, an increase of only 11%. In those 19 years there was a large increase in the diversity and an increase of 94% in volume of vegetables, excluding potatoes and sweet potatoes, from 710 million tonnes to 1.379 billion tonnes.



Vegetable market, Chile.

Fruit and vegetable production is often on a very large scale

The majority of modern horticulture production is done in large scale enterprises focussed on high volume output requiring a large amount of capital investment, large areas of land under cultivation, sophisticated methods of production and a high degree of management expertise. These large scale vegetable farms, extensive fruit orchards and mega-scale greenhouses often cover many hectares.

Large scale production is the only practical and economic system to reliably produce consistent levels of quality and volume for the year-round production that markets demand.

Generally more than one species of plants are grown to establish crop rotations, generate alternative sources of income, and provide year-round employment for the full supply chain involving a continuous sequence of expert skills. Some activities are contracted to other parties, for example specialist cool store operators and fruit packers, graders and marketers.

These large scale production units are vertically integrated, often having their own plant nurseries, crop cultivation and management machinery, harvest, grading and storage facilities, and options for freighting and marketing their own produce.

Growers receive only a small portion of the retail value of a crop from which they must manage all of the resources required for quality production. To manage these costs sophisticated tools are used to manage fertiliser and water inputs and target and minimise the use of herbicides and pesticides. With fewer and fewer people in the global work-

force being prepared to engage in land-based manual labour, producers are increasingly using highly specialised machinery and robotics.

To meet the high standards expected with any food-related activity considerable attention is paid to human hygiene and removing contamination from chemicals, dust and dirt, and unwanted debris. High-speed harvesting machinery, with GPS guidance and on-board quality tracking, delivering to post-harvest washing and preparation machinery are now standard requirements for most large-scale producers supplying the big metropolitan markets. Gains continue to be made in production efficiency. In fruit production, the ease of tree management has reduced labour inputs and better tree structures have reduced the incidence of pests and diseases. Nursery plant quality has improved through the use of compost growing media and environmental controls for optimising plant growth, and the use of vigour-controlling rootstocks. Enhanced yields and improved fruit quality have followed from higher tree densities and new pruning strategies that have shortened time to production.

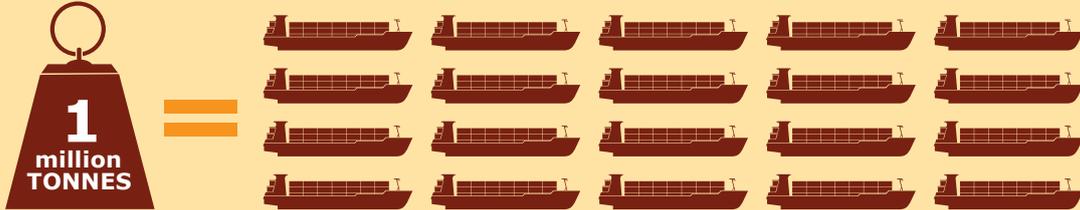
Vegetable growers aided by plant breeders have achieved advances in plant yields by selecting varieties with improved pest and disease resistance. Together with precision planting machinery, specific seed planting arrangements, precise positioning of fertiliser, and computer controlled irrigation management that is driven by environmental demand, the result has been increasingly optimised yields while efficiently using input resources.



Some horticultural units extend “as far as the eye can see”. Citrus (left) and berryfruit (right), California. PHOTOS: D. KARP

How much is a million tonnes? It's the capacity of about 20 typical large container ships.

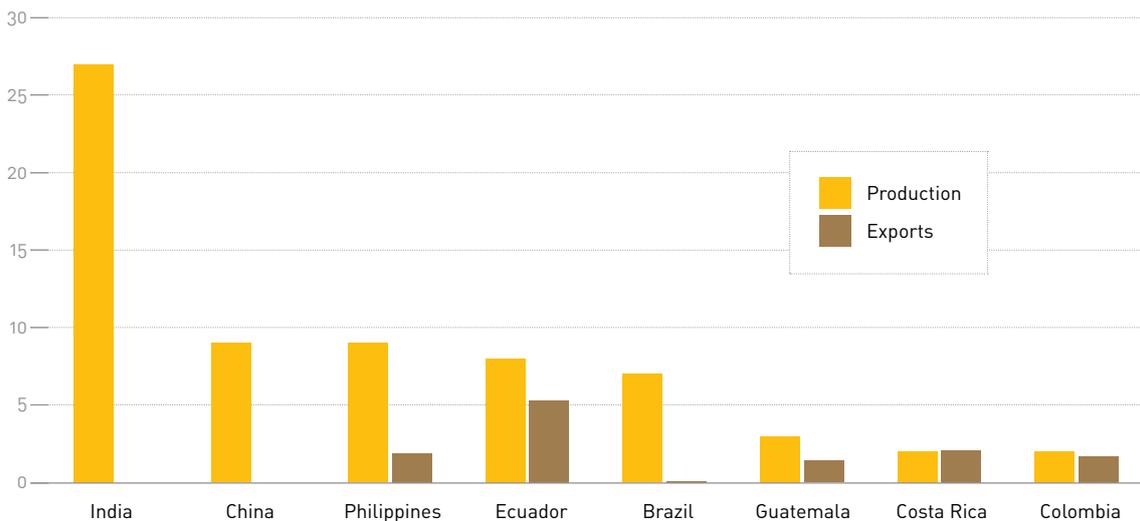
If you lined up, end-to-end, the container ships needed to carry the combined 2.4 billion tonnes of world production of fruit and vegetables, they would stretch from Brisbane, Australia continuously to Los Angeles, California (about 11,500 km).



Bananas: Top 5 producing countries compared with Top 5 exporting countries

SOURCE: FAOSTAT

Production (millions of tonnes p.a.)



The countries that produce the most fruit and vegetables are not necessarily the biggest exporters. Production and exports statistics can have quite different profiles.

The graph above compares the top five banana producing countries (61% of world production) with the top five banana exporting countries that between them produce only 13% of global banana production.

The differences are more reflective of the demands for self-sufficiency. In contrast, the opportunities to develop more diverse markets would require investment in infrastructure and the support for dealing with issues as diverse as sophisticated storage, packaging and freight considerations, through to meeting stringent market access requirements.

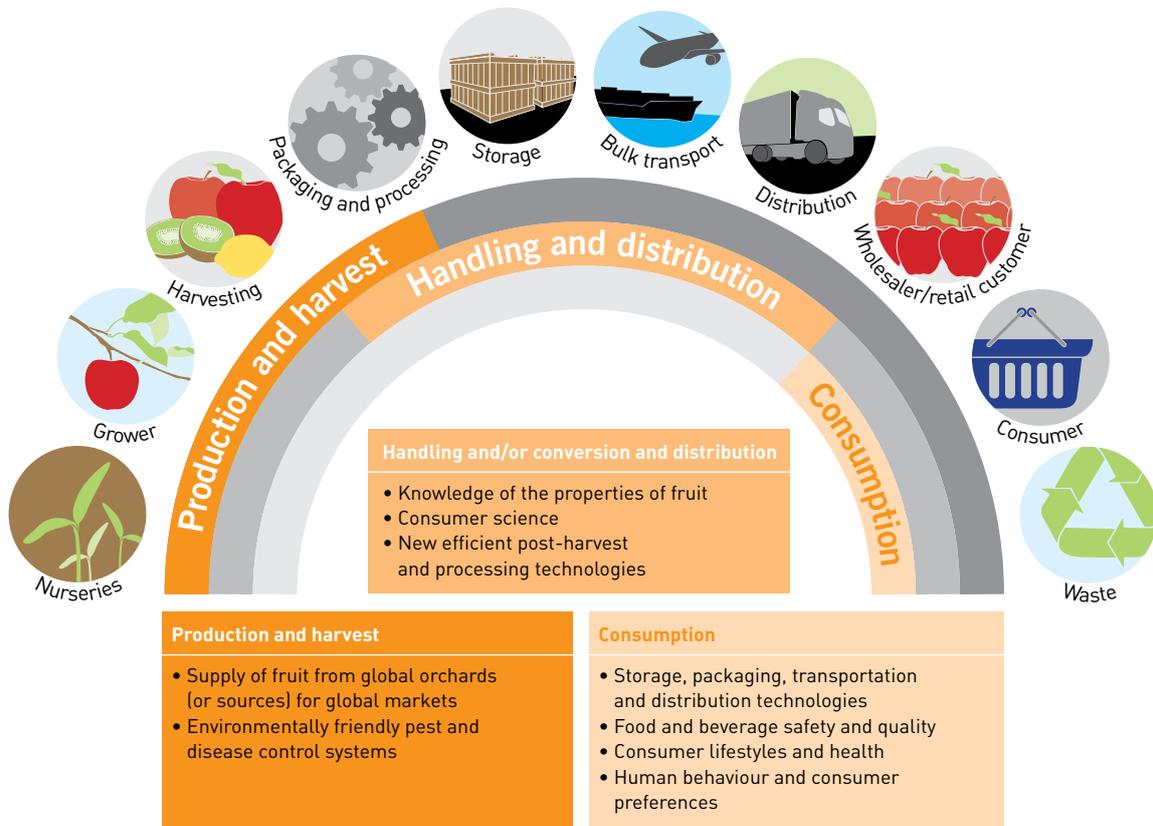
Thought Challenge #1

More than at any previous time in history, consumers in developed countries have a greater choice from a wider range of affordable fresh and processed fruit and vegetables.

Q. Are consumers aware, or care, that horticulture is undergoing a shift in the production of fruit, vegetables and flowers from countries with high-energy inputs and high labour costs to those with lower energy inputs and lower labour costs?

Horticulture supply chain – the many steps

Using fruit as the example



Production, processing and sales are each critical stages in the supply chain. Upper left: peaches, Cape Region, South Africa. Above right: citrus sorting, Thailand. Lower left: fresh fruit and vegetable retail, Venice, Italy. Lower right: transporting apples, Guangzhou, Guangdong Province, China.