

# Table of contents

## 1. Introduction

## 2. Human nutrition

### 2.1. Human nutrition: a general introduction

2.1.1. Digestive system

2.1.2. Nutrients

2.1.3. Macronutrients

2.1.4. Micronutrients

2.1.5. Other substances

2.1.6. Phytochemicals

2.1.7. Undesirable components

2.1.8. Balanced diet

### 2.2. Bioavailability

2.2.1. Enhancers of nutrient bioavailability

2.2.2. Inhibitors of nutrient bioavailability

### 2.3. Malnutrition

2.3.1. The big five: micronutrient deficiencies that cause major health problems globally

2.3.2. Prevalence of malnutrition

2.3.3. Malnutrition across socio-economic groups

2.3.4. Consequences of malnutrition

2.3.5. Nutrition problems in the Netherlands

### 2.4. Mitigating malnutrition

2.7.1. Biofortification

2.7.2. Nutrient requirements

2.7.3. Target values for breeders

2.7.4. Upper levels

2.7.5. Consumer perspective

## 3. Compounds in plant that provide nutritional value

### 3.1. Minerals in plants: a brief overview

### 3.2. Phytochemicals

3.2.1. Carotenoids

3.2.2. Flavonoids

3.2.3. Tocopherol: Vitamin E

3.2.4. Ascorbic acid (Vitamin C)

3.2.5. Phytic acid

## **4. How to measure nutrients in plant foods?**

### **4.1. Harvest and pre-treatments of food samples**

### **4.2. Analysis of minerals**

### **4.3. Analysis of phytonutrients**

### **4.4. Preparing phytonutrient extracts**

### **4.5. Detection of phytochemicals in food extracts**

### **4.6. Metabolomics: next generation phytochemical analysis**

## **5. How to change the amounts of compounds with nutritional value in plants?**

### **5.1. General explanation of effects of cultivation practices on plants**

5.1.1. Light

5.1.2. Temperature

5.1.3. Water and nutrients

5.1.4. Soil and substrate

5.1.5. Relative humidity and gas exchange

5.1.6. Phytohormones and plant volatiles

5.1.7. The dilution effect

### **5.2. The effects of plant fertilizers on the nutritional value of plants for humans**

5.2.1. Calcium

5.2.2. Potassium

5.2.3. Iron

5.2.4. Zinc

5.2.5. Selenium

5.2.6. Iodine

### **5.3. Effect of soil health on the nutritional value of plants for humans**

5.3.1. Examples of scientific difficulties in relating soil health and human health

5.3.2. Links between soil health, plant health and human health

### **5.4. Effect of Organic farming on the nutritional value of plants for humans**

### **5.5. The effects of light quality and quantity on the nutritional value of plants for humans**

5.5.1. Intensity

5.5.2. Spectrum

### **5.6. Examples of the impact of cultivar choice on the nutritional value for humans**

5.6.1. The effects of genotypical/cultivar differences on plant mineral content

5.6.2. The effects of species (genotypical/cultivar) differences on phytochemical concentration

5.6.3. The effects of grafting on plant nutritional value

### **5.7. Postharvest**

5.7.1. The living plant product and quality

5.7.2. From preharvest to postharvest quality

## 6. Conclusions and Future Outlook