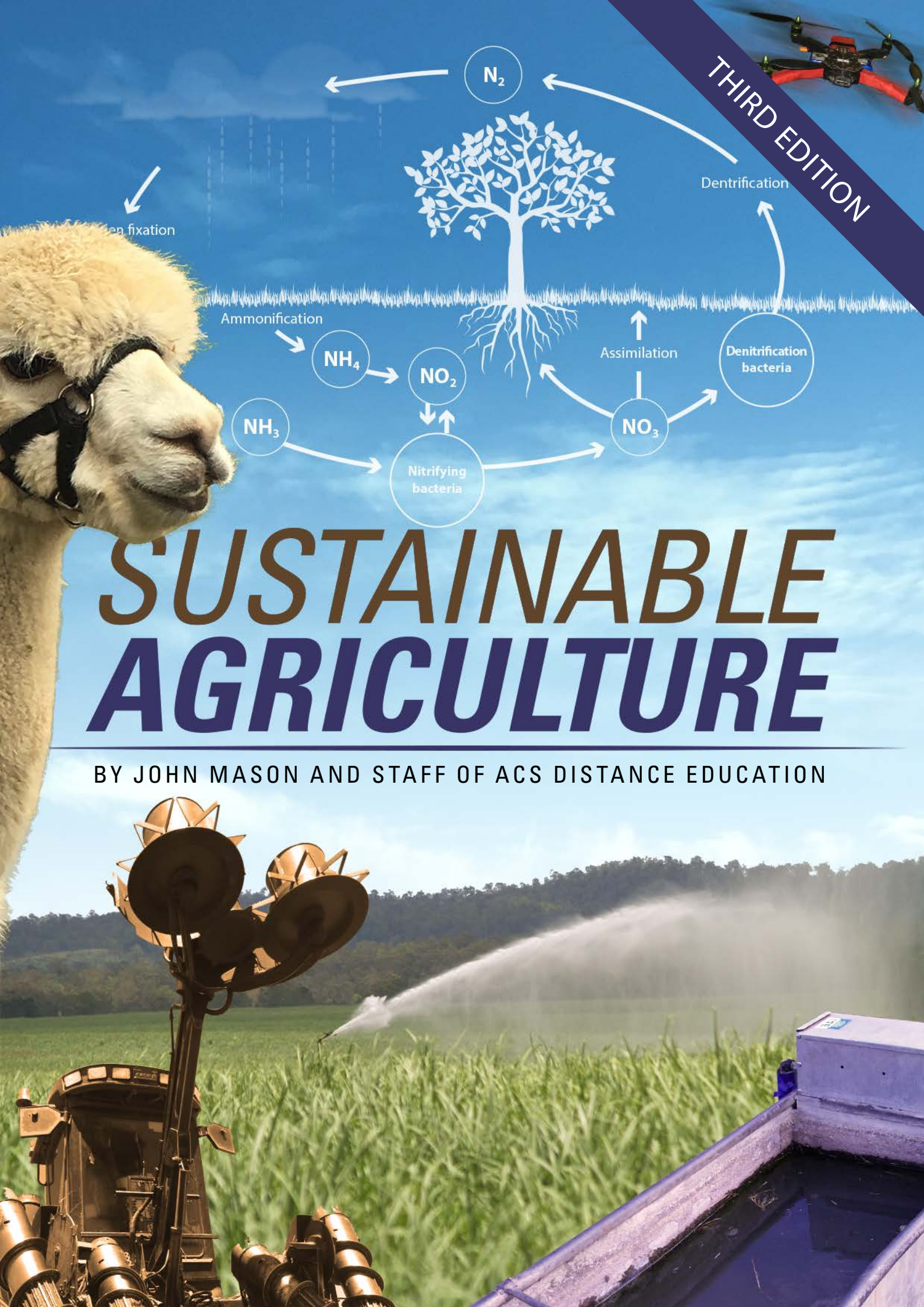


THIRD EDITION



atmospheric nitrogen fixation

Ammonification



Assimilation



Nitrifying bacteria

Denitrification bacteria

Denitrification

# SUSTAINABLE AGRICULTURE

BY JOHN MASON AND STAFF OF ACS DISTANCE EDUCATION

# CONTENTS

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Credits .....	12
Introduction.....	13
Why be sustainable?.....	13
<b>CHAPTER 1 DIFFERENT THINGS TO DIFFERENT PEOPLE .....</b>	<b>15</b>
What to do.....	16
Know your land.....	18
A) Evaluating a site.....	18
B) Land carrying capacity.....	21
C) Assessing land capability.....	22
An indication of sustainability.....	23
<b>CHAPTER 2 SUSTAINABLE CONCEPTS .....</b>	<b>24</b>
Natural farming.....	24
Organic farming.....	25
Whole farm planning.....	25
Systems thinking in sustainable agriculture.....	26
Permaculture.....	26
Minimal cultivation.....	30
No dig techniques.....	30
Biodynamics.....	31
Crop rotation.....	33
Seed saving.....	34
Urban farming.....	35
Hydroponics.....	35
Aquaponics.....	36
Vertical farming.....	37
Environmentally friendly farming.....	38
Checklist of sustainability elements.....	39
Sustainable agriculture around the globe.....	39
Case study: target 10, a model for sustainable agricultural development.....	42
<b>CHAPTER 3 SOILS .....</b>	<b>43</b>
Introduction.....	43
Growing media.....	44
Soils.....	44
Problems with soils.....	45
Major types of soil problems.....	46

1) Loss of soil fertility.....	46
2) Erosion.....	47
3) Salinity.....	49
4) Soil sodicity.....	51
5) Soil structural decline.....	51
6) Soil acidification.....	52
7) Build-up of dangerous chemicals.....	52
Improving soils.....	52
Adding organic matter.....	53
Cultivation techniques.....	57
Conservation tillage.....	58
Plant nutrition.....	59
Soil pH.....	61
Choosing the right fertiliser.....	61
Nutrient deficiencies.....	62
Natural fertilisers.....	62
Types of natural fertilisers to use.....	63
A look at organic fertilisers.....	64
Soil life.....	65
Earthworms.....	65
Mycorrhiza.....	66
Nitrogen fixing.....	66
Composting.....	66
The composting process.....	67
Guidelines for using compost.....	69
Mulches.....	70
General rules for mulching.....	72
<b>CHAPTER 4 WATER MANAGEMENT.....</b>	<b>75</b>
Water usage.....	75
Methods of water storage.....	76
Rainwater collection & storage.....	76
Water tanks.....	76
Bore water.....	77
Farm dams.....	78
Livestock water requirements.....	80
Water quality.....	81
Problems with water.....	81

Mosquitoes.....	81
Willows and waterways.....	81
Algal blooms.....	82
Livestock contamination .....	82
Flood.....	83
Water quality.....	83
Salinity.....	84
Testing water salinity.....	84
Treating saline water.....	85
Management options.....	85
Long-term strategies.....	85
Tastes and odours.....	86
Reed beds.....	87
Water saving measures.....	87
Recycling household water.....	88
Using farm/waste water.....	89
Water wastage.....	90
Evaporation .....	90
Seepage.....	90
Runoff .....	90
Overspray .....	91
Scheduling .....	91
Recycling waste water.....	91
Swales and keylines.....	92
Swales.....	93
Keyline design.....	93
Irrigation systems.....	94
Irrigation system design.....	94
Steps in the design process.....	95
Maintenance procedures and scheduling.....	96
Periodic inspections.....	96
Routine upkeep.....	97
Contingent work.....	97
Scheduling work.....	97
Surface or flood irrigation.....	97
Border check system .....	97
Hillside flooding .....	98
Furrow irrigation .....	98

Sprinkler irrigation.....	98
A) wind velocity and wetting pattern.....	98
B) drop size.....	99
C) rotational speed.....	99
D) evaporation.....	99
Innovations in water management and precision agriculture procedures and scheduling.....	99
<b>CHAPTER 5 PEST AND DISEASE CONTROL.....</b>	<b>100</b>
Use of pesticides.....	100
Pest management and systems thinking.....	100
Integrated pest management.....	101
Biointensive integrated pest management.....	101
Pesticides: a vicious cycle.....	102
Controlling pests and diseases in plants.....	102
Cultural controls.....	103
Physical controls.....	105
Sprays and dusts.....	108
Pesticides.....	109
Fungicides.....	110
Chemical control of pests and diseases in plants.....	111
Insecticides.....	111
Fungicides.....	112
Chemical application techniques.....	112
Biological controls.....	112
Antagonistic organisms.....	112
Advantages of bio-control methods.....	113
Disadvantages of biocontrol methods.....	114
Predators.....	114
Attracting parasites.....	114
Beneficial plants.....	115
Trap or decoy plants.....	117
Companion planting.....	117
Plants which affect the soil.....	118
Pest control plants.....	123
Legislation.....	124
Chemical use.....	124
Quarantine.....	124
Genetic engineering.....	124

Pest and disease control in animals.....	126
<b>CHAPTER 6 SUSTAINABLE WEED CONTROL &amp; CULTIVATION.....</b>	<b>129</b>
What is a weed?.....	129
Controlling weeds.....	129
Ways to control weeds without chemicals.....	131
Check soil condition.....	131
Minimise sources of weed seeds.....	131
Cultivation.....	132
Mulching.....	133
Biological weed control.....	133
Grazing.....	134
Goats.....	134
Other grazing animals.....	134
Chemical control of weeds.....	134
Herbicides.....	135
Contact herbicides.....	136
Woody weed herbicides.....	136
Residual herbicides.....	136
Pre-emergent herbicide.....	136
Selective herbicides.....	136
Herbicide additives.....	136
Plants which take over.....	138
Environmental weeds.....	139
Some plants to avoid.....	139
Noxious weeds.....	141
<b>CHAPTER 7 FARM MANAGEMENT.....</b>	<b>142</b>
Changing an existing farm to a sustainable property.....	143
The rodale institute conversion experiment.....	144
New farm products.....	145
Pre-planning.....	145
Considerations.....	146
Monitoring and reviewing the farm system.....	148
Socioeconomic considerations.....	149
Profitability.....	149
Social aspects.....	150
Production planning.....	150
Economy of scale.....	150

Materials.....	151
Equipment.....	151
Value adding.....	152
Organic certification schemes.....	153
Contingencies and seasonal variations.....	154
The expected.....	154
The unexpected.....	155
Types of problems.....	155
Planning for drought.....	156
Excessive water.....	158
What other planning do i need?.....	158
<b>CHAPTER 8 GROWING AND HARVESTING PLANTS.....</b>	<b>159</b>
Selection criteria for plants.....	159
Grain and other broad acre crops.....	160
Monoculture.....	160
Crop rotation.....	161
Row crops.....	162
Cover crops.....	163
Cover crop guidelines/principles.....	164
Legume cover crops.....	164
Types of cover crops.....	165
Ways of using a cover crop.....	174
Hay and silage.....	175
Silage production.....	175
Silage timing.....	176
Quality control.....	177
Hay.....	178
Hydroponic fodder.....	178
<b>CHAPTER 9 TREES, FODDER AND OTHER PLANTS.....</b>	<b>179</b>
Important reasons for having trees on farms.....	179
Agroforestry.....	181
Profitability.....	181
Design.....	182
Pruning/thinning.....	182
Harvesting.....	183
Timber trees.....	183
Paulownia.....	183

Pine plantations.....	184
Eucalyptus.....	184
Acacia.....	184
Fodder trees.....	184
Types of trees.....	184
Windbreaks.....	186
Windbreak design considerations.....	186
Windbreak plants.....	188
Firebreaks.....	190
Fire-prone areas.....	190
How to arrange plants.....	190
Maintenance of firebreak species.....	191
Habitat corridors for wildlife.....	192
Why create a wildlife corridor?.....	192
Benefits of wildlife corridors.....	192
Where to establish wildlife corridors.....	193
Types of wildlife corridors.....	193
Wildlife corridor design.....	193
Edge effects.....	194
Tree planting methods.....	195
Preparing the site.....	195
Planting seedlings.....	196
Direct seeding.....	197
<b>CHAPTER 10 SUSTAINABLE ANIMAL MANAGEMENT.....</b>	<b>198</b>
Possible problems of livestock production.....	198
Breed selection.....	198
Stocking rates.....	198
Fencing.....	199
Production systems.....	200
Land care practices.....	202
Pastures.....	203
Sustainable pasture varieties.....	203
Saltbush.....	203
How much grazing?.....	204
How long to graze?.....	205
Grazing methods.....	206
Other areas for grazing.....	207



Guidelines for raising different livestock.....	208
Alpacas.....	208
Aquaculture (freshwater).....	210
Cattle.....	211
Emus.....	213
Goats.....	213
Horses.....	214
Ostriches and emus.....	215
Poultry (chickens).....	216
Pigs.....	219
Sheep.....	220
<b>CHAPTER 11 TECHNOLOGICAL APPLICATIONS.....</b>	<b>223</b>
Introduction.....	223
Precision agriculture.....	224
Machines and tools.....	224
Tractors.....	224
Drones.....	227
Wearable technology.....	229
Robotics.....	229
Computer technology.....	230
Fertilisers and soil conditioners.....	231
Seaweed extracts.....	231
Fish fertilisers.....	232
Rock dusts.....	232
Chemical pesticides and herbicides.....	235
Soil microbes.....	235
New plants & animals.....	236
Biotechnology & sustainable agriculture.....	236
Modifying organisms genetically.....	237
Cloning.....	238
Problems for biotechnology.....	240
Nuclear and isotopic techniques.....	240
Further reading and study.....	241
More ebooks available.....	241
Courses available.....	241

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John Mason

The information in this book is derived from a broad cross-section of resources (research, reference materials and personal experience) from the authors and editorial assistants in the academic department of ACS Distance Education. It is, to the best of our knowledge, composed as an accurate representation of what is accepted and appropriate information about the subject, at the time of publication.

The authors fully recognise that knowledge is continually changing, and awareness in all areas of study is constantly evolving. As such, we encourage the reader to recognise that nothing they read should ever be considered to be set in stone. They should always strive to broaden their perspective and deepen their understanding of a subject, and before acting upon any information or advice, should always seek to confirm the currency of that information, and the appropriateness to the situation in which they find themselves.

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# INTRODUCTION

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First there was subsistence farming, and then there was a technological revolution. Developments in machinery and chemicals allowed us to clear and cultivate land rapidly, feed plants and animals quicker to grow them faster, and kill pests or diseases quickly. These newfound abilities seemed like a godsend to mankind and throughout the 20th century we used them to their fullest; generally, with little regard to any unforeseen repercussions.

Gradually, time has revealed a variety of problems caused by this modern agricultural development, including chemical residues affecting plant and animal life on land and in the sea, soil degradation in the form of soil structural decline, erosion, salinity, soil acidification, loss of fertility, nutrient loading of waterways, dams and lakes, and more.

In the 21st century as concern about our environment grows, there is an obvious move towards more sustainable farming practices.

Sustainable farming is in essence concerned with anything that affects the sustainability of a farm. You cannot keep farming a property indefinitely if there is degradation of resources (environmental resources, financial resources, equipment, machinery, materials, or any other resources). In the short to medium term, the problem of sustainability is overwhelmingly a financial one; but in the long term, environmental sustainability will have perhaps more impact upon the whole industry than anything else.

## Why Be Sustainable?

If we can't sustain agricultural production, we will eventually see a decline in production; hence a decline in food and other supplies. There is no escaping the fact that people need agricultural products to survive: for food, clothing, etc. Science may be able to introduce substitutes (e.g. synthetic fibres) but even the raw materials to make these will generally be limited. As the world's population increases, or at best remains stable in some places, demand for agricultural produce increases accordingly. Poorly maintained farms produce less in terms of quantity and quality. Profitability decreases mean that surplus money is no longer available for repair and improvements. Farmland can become contaminated with chemical residues, weeds or vermin. The amount of vegetation produced (i.e. the biomass) may reduce, resulting in less production of carbon dioxide and greater susceptibility to environmental degradation.

We have created a world that relies heavily on technology to produce the food needed to sustain its human population. There is a worldwide

dilemma. To abandon modern farming methods could result in worldwide famine, but to continue current practices will almost certainly result in long-term degradation of farmland and, eventually, the inability to sustain even current human population levels without even considering future population increases.

### **Who Should Be Concerned?**

Everyone needs to be concerned about a decline in farm production potential. The farmer, his family, and workers are always affected first. An unsustainable farm is simply not worth persisting with and any farm which heads this way must eventually be abandoned or redeveloped to become sustainable. This book is about foreseeing and understanding such problems and addressing them before it is too late.

# CHAPTER 1 DIFFERENT THINGS TO DIFFERENT PEOPLE

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*Sustainable farming means different things to different people however they all share a common concern in preventing the degradation of some aspect of the farm.*

Some farmers may be primarily concerned with degradation of natural resources (e.g. their land is becoming less productive). Other farmers may be more concerned about degradation of profitability, which could be due to increased labour or material costs, poor planning, or simply changing conditions in the economy. The causes and the solutions to such problems are different in each situation.

Sustainable agriculture is a philosophy: it is a system of farming. It empowers the farmer to work with natural processes to conserve resources such as soil and water, whilst minimising waste and environmental impact. At the same time, the “agro-ecosystem” becomes resilient, self-regulating and profitability is maintained.



Consider climate when deciding where and what to farm